THE NEXT WAVE OF FINTECH

REDEFINING FINANCIAL SERVICES THROUGH TECHNOLOGY

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VERSION 1.01

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ISBN: 978-91-773-058-7

STOCKHOLM SCHOOL OF ECONOMICS
CENTER FOR STRATEGY AND COMPETITIVENESS
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This project is funded by and written in collaboration with PA Consulting
The partnership emerged due to our mutual interest and experience in analysing the evolution of the Financial Services industry, both from before and during the comparatively new era of Financial Technology.

SYNOPSIS

In 2015, a team of researchers at the Stockholm School of Economics (SSE) under the leadership of Professor Robin Teigland produced the first Stockholm FinTech report, which received popular acclaim and paved the way for the newly established Stockholm FinTech Hub. In 2016, SSE members published an update report, with a forthcoming 2017 Stockholm FinTech Report and the book: The Rise and Development of FinTech: Accounts of Disruption from Sweden and Beyond".

In 2017, a sequel to the first Stockholm FinTech report was initiated.
It was during this that PA Consulting and SSE discovered a gap in the literature on InsurTech and RegTech. Drawing on the extensive Financial Services experience of PA Consulting, a focused research project on these topics was initiated.

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KEY FINDINGS OF THE REPORT

The taxi industry has existed for centuries. Until 2009, nobody would have thought it was possible that there would be one international company providing transportation services for individuals – until Uber came along.

Similarly, the Fintech industry is evolving so dynamically that some of the data in this report is likely be out of date by the time it is read. There are two subcategories, of FinTech, Insurance related technologies (InsurTech) and Regulatory related technologies (Regtech), which are at the core of this report.

The InsurTech section of the report, focuses on the underlying drivers of InsurTech, suggests a taxonomy, examines Swedish players, intra-organizational relations between current industry leaders and start ups, and looks at possible future scenarios.

Insurtech is a very new development and we suggest it should be defined as: *InsurTech refers to the use of technology innovations and digitalised processes to generate new business opportunities, increase quality, savings and efficiency at various value-added steps in the insurance industry model*.

The following taxonomy and key developments within InsurTech are outlined:

- **Distribution: Disrupting the insurance distribution model,**
- **Personalisation,**
- **On-Demand Insurance: The great unbundling,**
- **Risk Detection and Risk Prevention,**
- **Consumer Communities (P2P),**
- **Customer Engagement,**
- **Underwriting and Reinsurance,**
- **Claims Management and Processing.**

The report outlines how customer needs and wants have shifted with a growing “digitisation of trust” introducing a contradictory mix of personalisation and convenience. Individuals may be less loyal to their traditional providers, and more willing to explore new and better solutions for their financial endeavours.
Growing access to available data, for example from smart watches, gives insurers the opportunity to monitor behaviours and predict accidents, which allows the customer to be given the opportunity to reduce risk premiums. Technology may be the catalyst for the most impactful change since the beginning of the insurance industry – the shift from reactive to pro-active business models: not only is the distribution model changing, the products are evolving as well.

Some aspects of the insurance value chain are more prone to unbundling and disruption than others. For instance, the insurance distribution and brokerage section of the value chain has seen shifts in those maikng profits from incumbents to new entrants.

This is arguably due to the lower levels of capital requirements for these activities, and it is therefore within this section that most of the InsurTech startup activity has taken place. InsurTech risk capital funding, within the deals between 2012–2017, is mostly directed towards the property and casualty sector, pulling in 61% of total deals (CB Insights, 2017b).

Susanne Bergh, Head of Customer and Channels at Länsförsäkringar, points to the challenge that Swedish insurance companies are facing as sharing economy platforms become more commonplace, using the motor sector as an example: *When autonomous cars get more common and car ownership declines, the car pools that offer these transportation services are not going to appoint a Swedish insurance company to cover their fleets*.

Conversely, Sweden hosts a number of InsurTechs that look beyond Sweden as their main market. With nimble operations and a global perspective, these companies aim to establish themselves as partners and providers of technology services that transcend national boundaries. Stockholm, as well as other cities in Sweden, is well placed to host technology companies that can innovate in the insurance industry.

Swedish incumbents and InsurTech startups have reason to be optimistic about the future of the insurance landscape. For the startups, there are signs of increased risk capital on the market, and customers, both within B2C and B2B are on the lookout for more personalised, proactive, and cost-efficient insurance products.

In the RegTech section of the report, we examine how new regulations are affecting financial incumbents as well as what compliance and regulatory technological solutions are available to meet the challenges these regulations pose. It focuses on the underlying regulatory drivers of RegTech, suggests a taxonomy, examines Swedish players, how RegTech plays out in a set of regulations, and looks at possible future scenarios.

Soon after the collapse of Lehman Brothers, international heads of government attended the G20 summit in Washington D.C. to discuss the global financial regulatory framework. Two years later the G20 tasked the Basel Committee on Banking Supervision (BCBS) with the objective of providing an international regulatory framework. This resulted in one significant regulation on risk data aggregation and reporting, the so called “BCBS239”.

The role of a regulator is to ensure a well-functioning and stable financial market. This means that the regulator’s mandate is to guarantee stability, market integrity, competition, fair consumer protection and a growing amount of transparency. The cost for financial incumbents (FIs) to be compliant is increasing and companies that are able to reduce compliance costs will be able to focus on enhancing the customer experience and increase the perceived value of services. Companies that do not adapt will eventually reach a point at which the perceived value does not exceed the production costs and they will be overtaken by the competition.

RegTechs operate predominantly in this field and try to act as a bridge between established financial institutions and regulatory bodies. Since 2012, USD2.99 billion has been invested into RegTech startups. Furthermore, over 40% of these investments were made in early-stage companies. Avara, a tax management company, received the largest amount of funding, USD253 million. Corporate investment has also increased over time, from USD65 million in 2012 to USD236 million in 2016.

FIs must respond to the key objectives laid out by regulators: a long-term strategy to solve compliance issues is necessary. Swedish financial firms have acknowledged this and are actively investing to develop the architecture needed to facilitate a smoother compliance process.
However, short deadlines are forcing them to first develop tactical short-term solutions to meet these deadlines. For instance, when discussing SEB strategy to comply with new regulations, Linda Hedvall, Global Head of Compliance Monitoring, commented, *It is about actually coming to be able to build something that really adds value for our clients. (…) That’s what we aim for, and I think that a lot of regulations that are coming now are helping us in that direction*.

Due to the nascent stage of the RegTech industry and the large numbers of upcoming regulations, companies have not yet reached a consensus on its taxonomy. Through a careful examination of the regulations impacting FIs in Sweden, we have derived the following taxonomy.

	DESCRIPTION	WHAT THEY OFFER
1	Risk Data Aggregation	Solutions for traditional financial and risk reporting including how to aggregate and reconcile data.
2	Financial Crime	Solutions for managing KYC and AML together with new technologies.
3	Transaction Reporting	Solutions for collecting, disseminating and reporting transactions with shorting intervals according to the new requirements.
4	Conduct and Market Integrity	Solutions for detecting insider trading and market abuse.
5	Monitor and Detect	Solutions for monitoring and detecting fraud in all channels. This include using AI based solutions for audio analysis.
6	Data Management and Technologies	Solutions for Master Data Management, Definitions, Standards and Data technologies.
7	Actor Management	Solutions to handle customers, counter parties and other actors.
8	Internet of Things	Enable data collection via smart devices.
9	Regulatory Requirements Management	Solutions for responding to regulations.

Table 1. Taxonomy of RegTech

One of the most significant aspects of regulatory management is how to handle customer information, counterparties and other actors. FIs must comply not only with existing regulations during the on-boarding cycle but also with changes in actor information management requirements such as KYC, with periodical updates as well as changes in regulations. Managing this is key to complying with almost all current and upcoming regulatory requirements.

Secondly the aggregation of risk data is key for any FI. The 2008 financial crisis revealed that large FIs had their data stored separately in data silos. This resulted in inadequate stress tests, as FIs did not have a complete overview of their risk exposures. FIs have historically suffered from a lack of corporate and enterprise architecture, and principles for information management. The risk-aggregating process has thus become expensive and time-consuming. By aggregating risk data and automating the process, FIs will be able to produce appropriate stress scenarios and then modify their portfolio accordingly. Most firms might consider the cost of complying with BCBS 239 as an investment that will eventually pay off.

The long term regulatory pressure requires FIs to re-architecture their data infrastructure and obtain a holistic view of their clients. FIs should look for technologies that will allow them to provide the best service at the lowest cost and cooperate with those firms or individuals that are best at providing compliance solutions to stay competitive. FIs should evaluate which parts of their services and operating processes could be outsourced to more efficient technology companies to remain competitive. It is important to highlight that the RegTech industry still at an immature stage and not all solutions are perfect but many are promising. For that reason, we recommend that FIs cooperate with RegTechs and participate in the development of this exciting new industry. The long-term consequences of these regulations, if firms can take advantage of economies of scale, is a horizontally integrated financial industry characterized by digitization and built on a Lego type structure.

When talking about the outlook for FIs, FinTechs and RegTechs, Lan-Ling, the Head of Women in FinTech at Stockholm FinTech hub, argued that: *There will be many more companies that will take part of the value chain away from the banks, and that banks might find themselves to be more like a utility company. At the same time banking is regulated for a reason. Given that they are regulated, it is not obvious that FinTechs are going to win that particular game. Technology can help, and FinTechs are much nimbler, but they are not robust. One of the reasons why banks are not nimble is because they can’t afford a problem, they can’t afford the security issue, they can’t afford mistakes. On the contrary, FinTechs can have some mistakes because they are young and nobody expects them to be perfect. However, once they become part of the system excuses will not be accepted*.

Credits: Simon Paulin / imagebank.sweden.se

Cooperation discussions, among InsurTech startups and incumbents, have not taken off yet or at least are not yet at the level of the FinTech sector.
- Mikael Lundberg, Advisor to the Stockholm Fintech Hub

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1. INTRODUCTION

Looking back to 2009, when Uber launched its car transportation platform, few experts predicted that the service would initiate a wave of disruptions in the taxi industry, often to the detriment of the established players and to the benefit of consumers. Eight years later, Uber, Lyft, Careem and other similar platforms across the globe have increased their market shares and revenues, notwithstanding frequent run-ins with national legislators, regulators, and taxi unions. Traditional taxi companies' presence as the foremost service provider in the mind of consumers has been diminished. An increasing number of consumers default to finding the most appropriate service provider, which is the one that has the best features and prices, as opposed to staying loyal to only one service provider.

A similar pattern of industry transformation has yet to fully take place within the financial services sector. However, one could argue that similar developments are likely to occur in the near future. At the core of this development is Financial Technology or FinTech, a movement that truly started to take shape in the aftermath of the 2008-2009 financial crisis. The level of investment in this industry has risen from USD2.5 billion in 2012 to USD13.5 billion in 2016 (CB Insights, 2017d). With an increasing number of FinTech companies disrupting the value chains of traditional financial institutions, one can start to see a similar pattern emerging to that in the taxi industry, where consumers are becoming less loyal to their traditional providers and more willing to explore new and better solutions for their financial activities.

This change in behaviour has so far mostly impacted the services offered to consumers, such as payments, wealth management, and consumer borrowing and lending. Today, we are seeing more and more startups and technology incumbents approaching the B2B segment of finance and insurance, enabling better and faster business processes for financial institutions to serve their end-customers, mitigate risks, and comply with increasingly fluid and international regulatory environments.

1.1 FINTECH DISRUPTION

Three key developments took place in the wake of the 2008-2009 financial crisis that would initiate the transformation of the financial services industry.

- Stricter Regulations: Firstly, regulators across the globe responded with stricter regulations and directives to facilitate a safe road to economic recovery and to ensure the prevention of similar financial crises. These included Basel III, MiFiD II, GDPR and the Dodd Frank Act.
- Diminishing Consumer Trust: Secondly, financial institutions faced a diminishing level of consumer trust. According to the Edelman TrustBarometer, in 2016 Financial Services were the most distrusted industry, whereas Technology Services were the most trusted (Edelman, 2016).
- Technological advancements: Lastly, as a result of technological advances particularly within mobile technologies, and the digitization of analogue processes across a range of consumer services, FinTechs are increasingly competing for consumers who, for a long time, had been loyal bank customers.

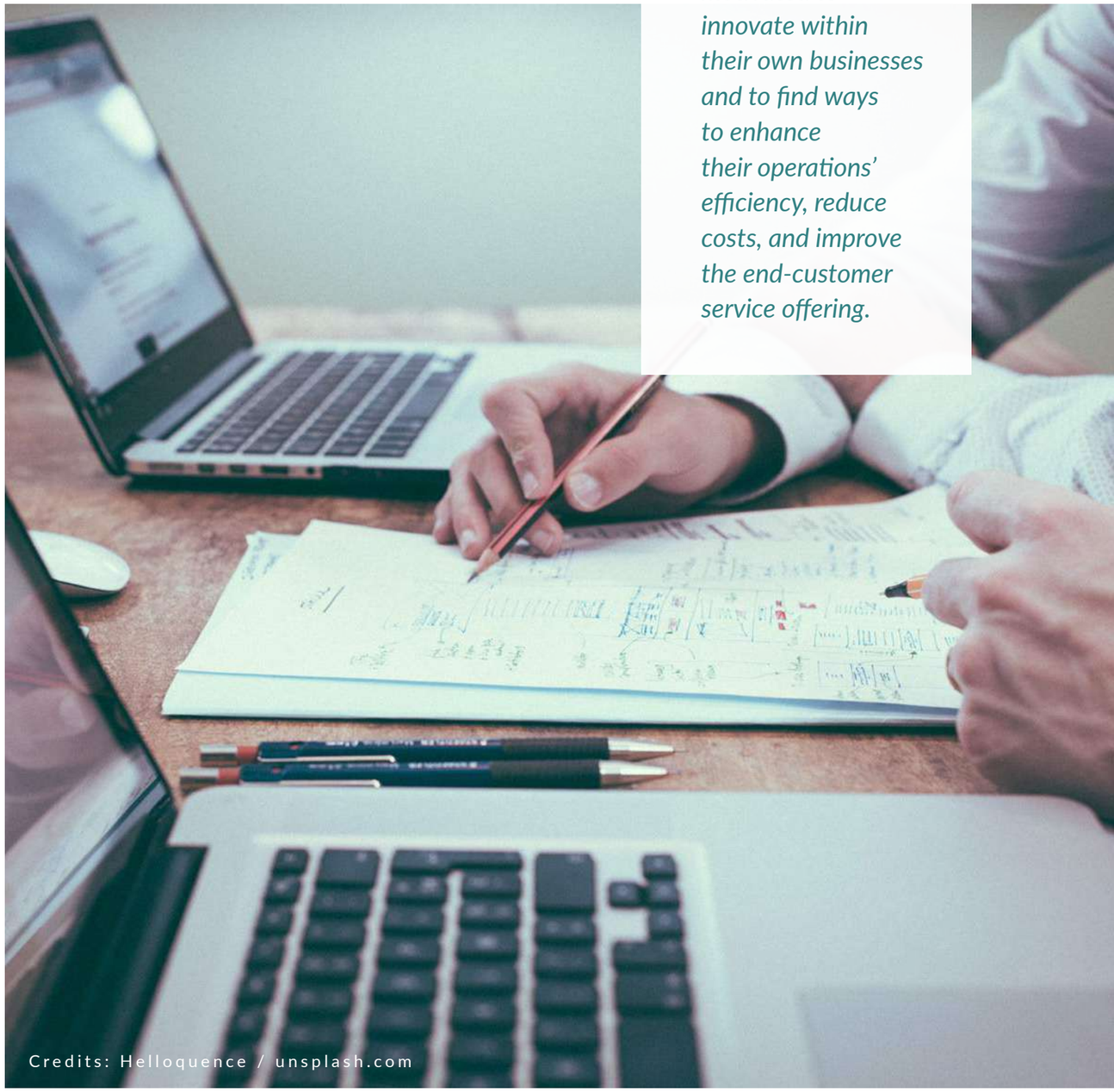
The rise of InsurTech and RegTech

Traditional players have acknowledged the disruptive forces reshaping the financial industry and have become increasingly motivated to innovate within their own businesses and to find ways to enhance their operations' efficiency, reduce costs, and improve the end-customer service offering.

Similarly, the insurance industry, an industry notoriously slow to adopt new technologies and processes, has started to reinvent itself, led both by incumbent players in addition to being stimulated by the entry of new players.

This report aims to illustrate the rise and development of the nascent fields of InsurTech and RegTech, drawing on lessons and examples from Sweden and beyond, to arrive at key takeaways and recommendations for incumbents, startups, policymakers, and investors to enable them to make informed decisions about the future of a budding domain within the Financial Services industry.

Traditional players have acknowledged the disruptive forces reshaping the financial industry and have become increasingly motivated to innovate within their own businesses and to find ways to enhance their operations' efficiency, reduce costs, and improve the end-customer service offering.



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InsurTech and RegTech represent a similar wave of disruption, to that seen in the Financial Services industry.

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2. INSURTECH

2.1 INTRODUCTION

As noted by Pascal Bouvier, a FinTech investor at the Banco Santander, there is good reason to believe that insurance is heading towards a period of disruptive innovation, with an increasing number of components of the insurance service offering change due to digitalization, including distribution, risk management, and the core product, insurance itself (Bouvier, 2015).

By and large, the insurance industry is characterized by slow growth and incumbent insurers that have been comparatively complacent, yet enjoyed an uncontested access to customers, even by offering products that have not kept up with the increasing pace of digitalization. In line with the increasing competition from adjacent sectors and the influx of new players, incumbents have started to realise the potential threat of disruption and an associated need to change and adapt to the new market conditions. Some argue that the insurance industry is witnessing a similar wave of disruption and change to that seen in the financial services industry.

FinTechs, often startups with nimble operations and novel solutions, have been disrupting the banking and finance industry for some time, most notably gaining traction in the wake of the 2008 financial crisis. By innovating in smaller subsets of traditional banking services such as payments, they can offer better services at cheaper prices to end consumers. This means they have increasingly made inroad into a market that has traditionally been served exclusively by financial institutions.

FinTech has changed considerably in the past decade, with incumbent financial institutions increasingly taking on the challenge and responding to the disruptive forces unleashed on them by the smaller startups, by either competing head on or partnering up with their smaller peers.

In a similar manner to the successive increases in complexity in the FinTech industry, one could argue for a similar change trajectory in insurance. Whereas underlying insurance products have been fairly similar in recent years, the way in which these products are delivered to end-customers has changed drastically in some markets. In the UK, the market share of insurance aggregators has risen to just under 60% in ten years, to the detriment of traditional insurance brokers (Altus Consulting, 2017). **In other words, we are witnessing a shift in the way that traditional insurance products are being sold to customers.** Aggregators have not only impacted the way in which insurance is sold, but have also put an increased emphasis on price, which some argue leads to a “race to the bottom” for the insurance carriers.

It is not only the way in which insurance products are being delivered that is changing. With the aid of digital tools and technologies, the underlying insurance product, too, is evolving.

In this section, we elaborate on the changes that are currently taking place in the insurance industry.

2.2 DEFINITION OF INSURTECH

An attempt to arrive at a universally acknowledged definition of InsurTech will likely prove difficult given the tender age of the vertical. Although technology has been applied to insurance for decades, the portmanteau term 'InsurTech' only started to emerge around 2011-2012, with one early example being the rollout of the Aviva Insurance telematics app for motor insurance. Some five years later, activity has accelerated rapidly, with an increasing number of technologies being developed and deployed across the insurance value chain (Braun and Schreiber, 2017).

Below we will examine two examples to guide our understanding and ultimately produce a definition for the purposes of this report.

Investopedia, an online encyclopaedia for finance, banking, and insurance, has defined InsurTech as the following (Investopedia, 2017): *InsurTech refers to the use of technology innovations designed to squeeze out savings and efficiency from the current insurance industry model. InsurTech is a portmanteau of "insurance" and "technology" that was inspired by the term FinTech.*

BaFin, the German Financial Conduct Authority, offers a slightly more developed definition of the term 'InsurTech' (BaFin, 2017): *InsurTech' companies, a type of the so-called FinTech companies, specific to the insurance industry. By using digitalised processes and exploiting the competitive advantage that these entail, these companies are trying to establish themselves on the market at various different value-added steps, and are thereby increasing the momentum of digitalisation. As they are able to do this without being tied to existing products, systems, structures and staff, they promise to be more efficient than established providers.*

One benefit of the above definition is that it more appropriately captures the way in which these companies are able to compete with the incumbents by not "being tied to existing products, systems, structures, and staff" (BaFin, 2017).

During the process of writing this report, the research team, together with PA Consulting and industry experts, started to elaborate on the above definitions to arrive at the following:

InsurTech refers to the use of technology innovations and digitalised processes to generate new business opportunities, increase quality, savings and efficiency at various value-added steps in the insurance industry model.

Figure 1. SSE & PA InsurTech Taxonomy

2.3 A TAXONOMY OF INSURTECH

As we are currently in the early days of InsurTech, researchers have yet to agree on a common definition and taxonomy of the InsurTech landscape. One common weakness of the current attempts to classify the landscape is that they often fail to capture clear boundaries between the different categories. Understandably, InsurTech companies are not isolated from the surrounding insurance landscape and therefore there is an increase in the likelihood of category overlap.

Customer focus and value chain approach

A simple way of categorising InsurTech companies is to look at the overarching insurance value chain and then divide companies into categories based on their main focus. According to Ravi Kurani, from the Venture Capital firm EarlyBird Ventures (Kurani, 2017), InsurTech companies can be divided into two categories based on the type of customers they serve.

InsurTech companies either serve policy holders, such as private customers or businesses and therefore fall under the Business-to-Consumer (B2C) segment, or they support existing insurance companies with technologies, sales channels, or other services and are therefore categorised under the Business-to-Business (B2B) category.

Business-To-Consumer (B2C)

First, Kurani looks at the value chains for B2C-facing InsurTechs and the areas in which they can create value for end-customers.

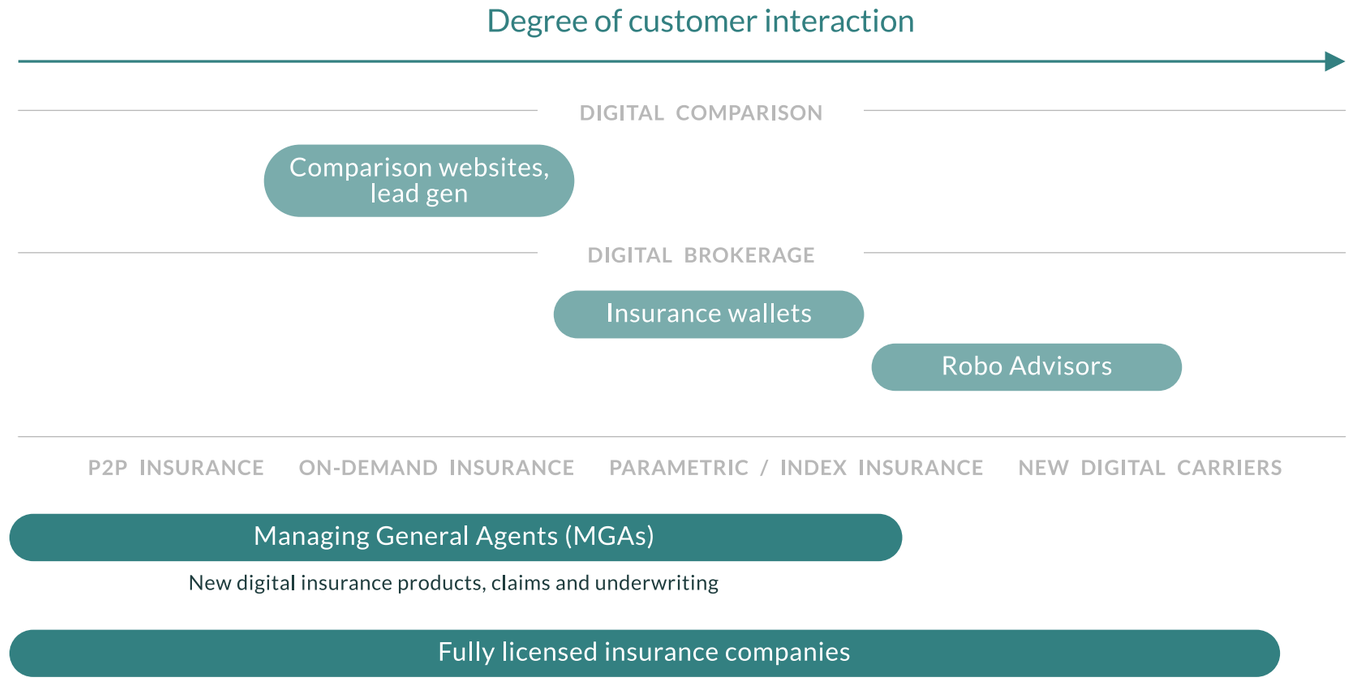


Figure 2. B2C InsurTech value chain. Adapted from Kurani (2017)

Business-To-Business (B2B)

Second, he looks at the B2B-facing InsurTechs that accommodate the needs of existing insurance carriers by using one of the major KPI metrics for insurance companies: the Combined Ratio (CR below). He argues that companies operating in a mature market, such as in insurance, should focus their efforts on *optimizing the performance of their existing business by increasing revenues and cutting costs* (Kurani, 2017).

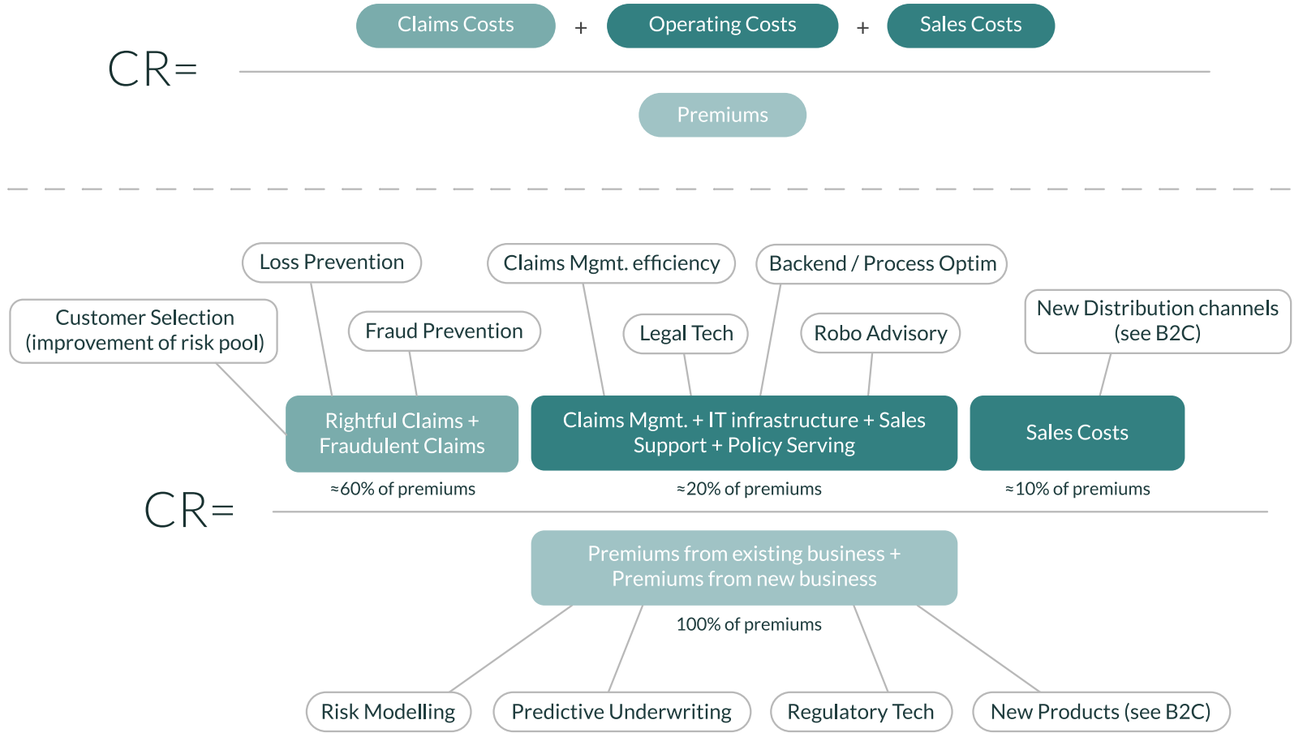


Figure 3. B2B InsurTech Value Chain. Adapted from Kurani (2017)

CB Insights InsurTech Taxonomy

Another way to categorise InsurTech companies is by looking at the aspect of the insurance industry they focus on. There have been numerous attempts at this with various approaches used and varying degrees of specificity achieved. CB Insights (2015), for example, divides InsurTech companies into eight InsurTech categories, as seen in Figure 4.

Figure 4. CB Insights InsurTech Taxonomy. Adapted from CB Insights (2015)

Braun and Schreiber's InsurTech Taxonomy

Braun and Schreiber (Braun and Schreiber, 2017) have divided the InsurTech landscape into nine categories:

1. Comparison Portals,
2. Digital Brokers,
3. Insurance Cross-Sellers,
4. Peer-to-Peer Insurance,
5. On-Demand Insurance,
6. Digital Insurers,
7. Big Data Analytics & Insurance Software,
8. Internet of Things,
9. Blockchain and Smart Contracts.

Further details of these categories are provided in Table 2.

	DESCRIPTION	WHAT THEY OFFER
1	Comparison Portals	Enable online comparisons between various (insurance) products, providers, and provider types.
2	Digital Brokers	Brokerage of insurance policies through web-based portals or mobile apps.
3	Insurance Cross Sellers	Offer insurance as complementary to products (typically at the point of sale or in an own app).
4	Peer-to-Peer Insurance	Brings together private parties for mutual insurance coverage.
5	On-Demand Insurance	Offers coverage for selected periods of time.
6	Digital Insurers	Offer fully digital insurance solutions that are only accessible via online channels.
7	Big Data Analytics & Insurance Software	Provide software solutions.
8	Internet of Things	Enable data collection via smart devices.
9	Blockchain & Smart Contracts	Create solutions for a tamper-proof distributed database system for transactions.

Table 2. Braun and Schreiber's InsurTech Taxonomy. Adapted from Braun and Schreiber (2017)

Investment landscape

Some recent global investment deals point to the increasing interest in and expectations of the impact of digitalization on one of the oldest and largest industries in the world. CB Insights, in its 2017 InsurTech briefing report (CB Insights, 2017b), estimated the global insurance industry to be valued at USD170bn and that over 90% of this value is controlled by incumbents. In other words, the market potential itself may entice investors to enter the market. From 2012 until the second half of 2017, over USD7.1bn has been invested across 605 deals globally, according to CB Insights (CB Insights, 2017b).

As seen in Figure 5, it is evident that most of the venture funding volume is attributable to the US market, with the UK being the largest European market for InsurTech funding. One of the reasons for this may be the fundamental difference in the ways in which FinTech verticals – such as Payments and Robo-advisory – are set up in comparison to many InsurTech offerings. In many instances, insurance products are complex and require significant institutional balance sheets to support the end-customer offering. Startups, therefore, often lack the capital required to compete head-on with traditional insurers, and therefore are better positioned to change and improve certain aspects of the value chain. One could argue that InsurTech startups are therefore, by design of the insurance industry, forced to partner and/or collaborate with incumbents to be able to innovate the insurance offering.

Sabine van der Linden, the Director of Startup Bootcamp InsurTech, an insurance accelerator, argues that InsurTech startups have recently, *moved from trying to disrupt the industry to enhancing it by partnering with incumbents* (Oxbow Partners, 2017).

Despite this, some aspects of the insurance value chain are more prone to unbundling and disruption than others. For instance, the insurance distribution and brokerage section of the value chain has seen shifts in profit from incumbents to new entrants. This is arguably due to the lower levels of capital requirements for these activities and it is therefore within this field that most of the InsurTech startup activity has taken place. Correspondingly, the InsurTech risk capital funding, within the deals between 2012–2017, is mostly directed towards the property and casualty sector, pulling in 61% of deals (CB Insights, 2017b).

Due to the tender age of the InsurTech vertical, it only constitutes a fraction of the overarching FinTech market, with relatively few large company valuations and exits, but the industry is accelerating rapidly. In September

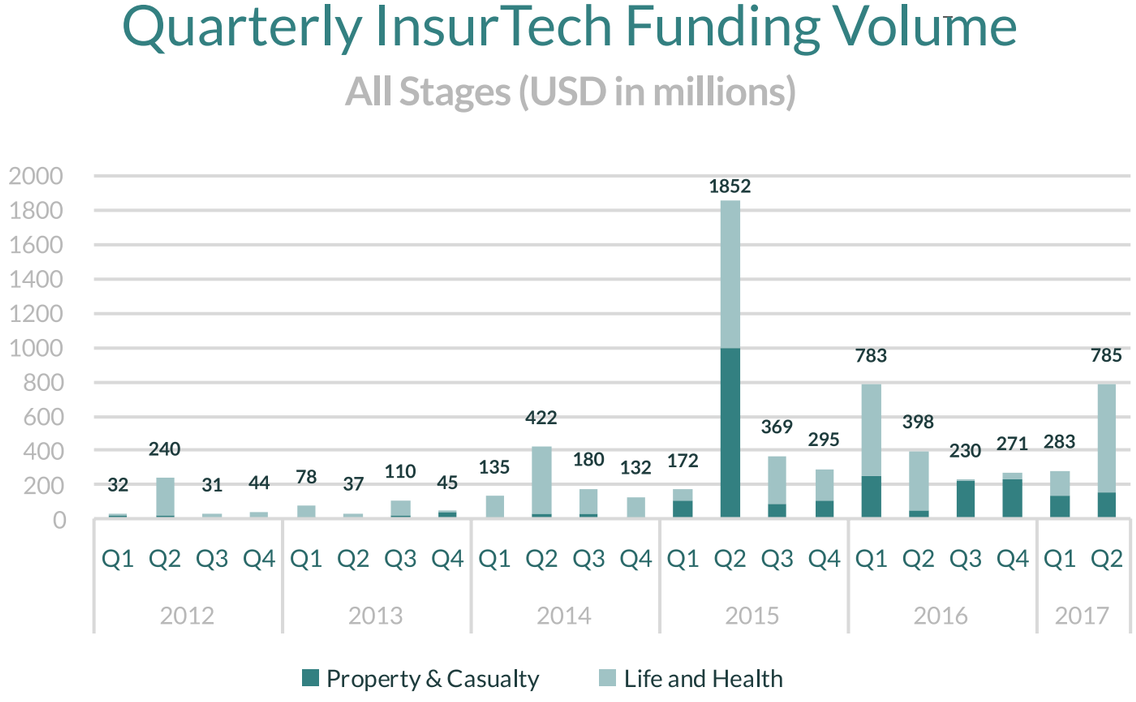


Figure 5. Quarterly InsurTech Funding Volume. Adapted from CB Insights (2017)

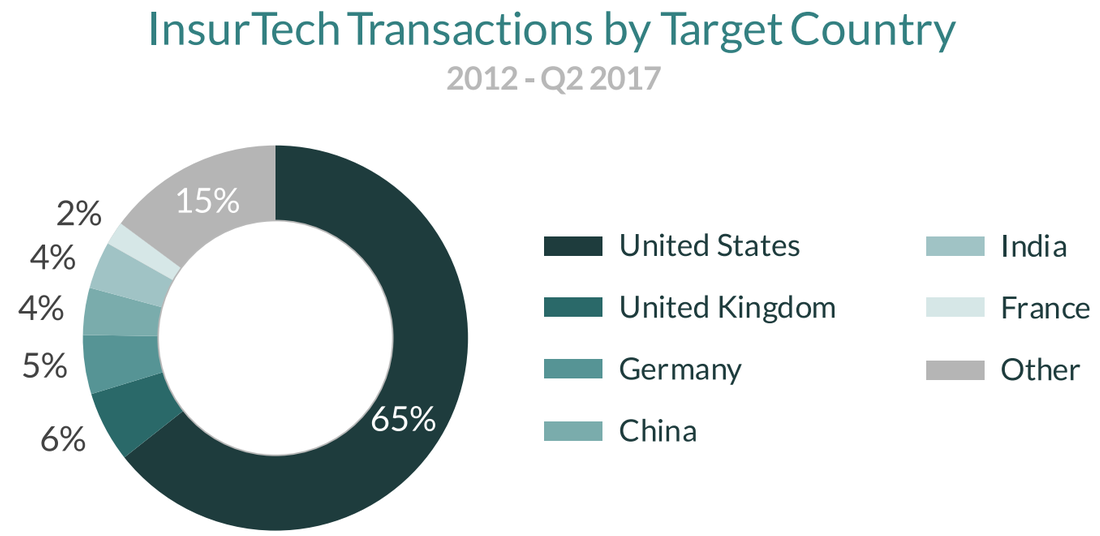


Figure 6. InsurTech Transactions by Country. Adapted from CB Insights (2017)

2017, ZhongAn Online Property & Casualty Insurance performed the first ever InsurTech IPO, raising over USD1.5bn on the Hong Kong Stock Exchange, HKEX, drawing on board institutional investors, such as SoftBank. Part of the reason for the high valuation is that the company managed to sell "5.8bn policies to 460m customers over a three-year period" (Weinland and Ralph, 2017), which was deemed almost almost impossible for a traditional insurer.

The group is innovating around its business model, testing the potential of new insurance policies, such as its successful 'shipping return policy'. It sold 100m of these policies during busy online shopping times like Cyber Monday. Arguably, the fact that the firm is focusing on new sales channels is due to its relationship with the E-commerce group Alibaba, one of its largest shareholders.

A key takeaway from the above example is the fact that insurance companies need to follow customers more closely in order to succeed. In addition to reducing operating costs, utilizing new sales channels, and complying with new regulations, the next generation of insurance companies must pay attention to the movements of their customers and make sure to follow them in their lives they cater to their changing needs.

In discussions with CEO Christer Braaf and COO Patrik Kähäri of Insurance Simplified, a digital insurance advisory startup in Stockholm, about the investment outlook for InsurTech in Sweden, they argue that there seems to be interest from venture capitalists to invest in the vertical. Christer says that, *So far no one has turned down a meeting with us, and some of them are even contacting us.*

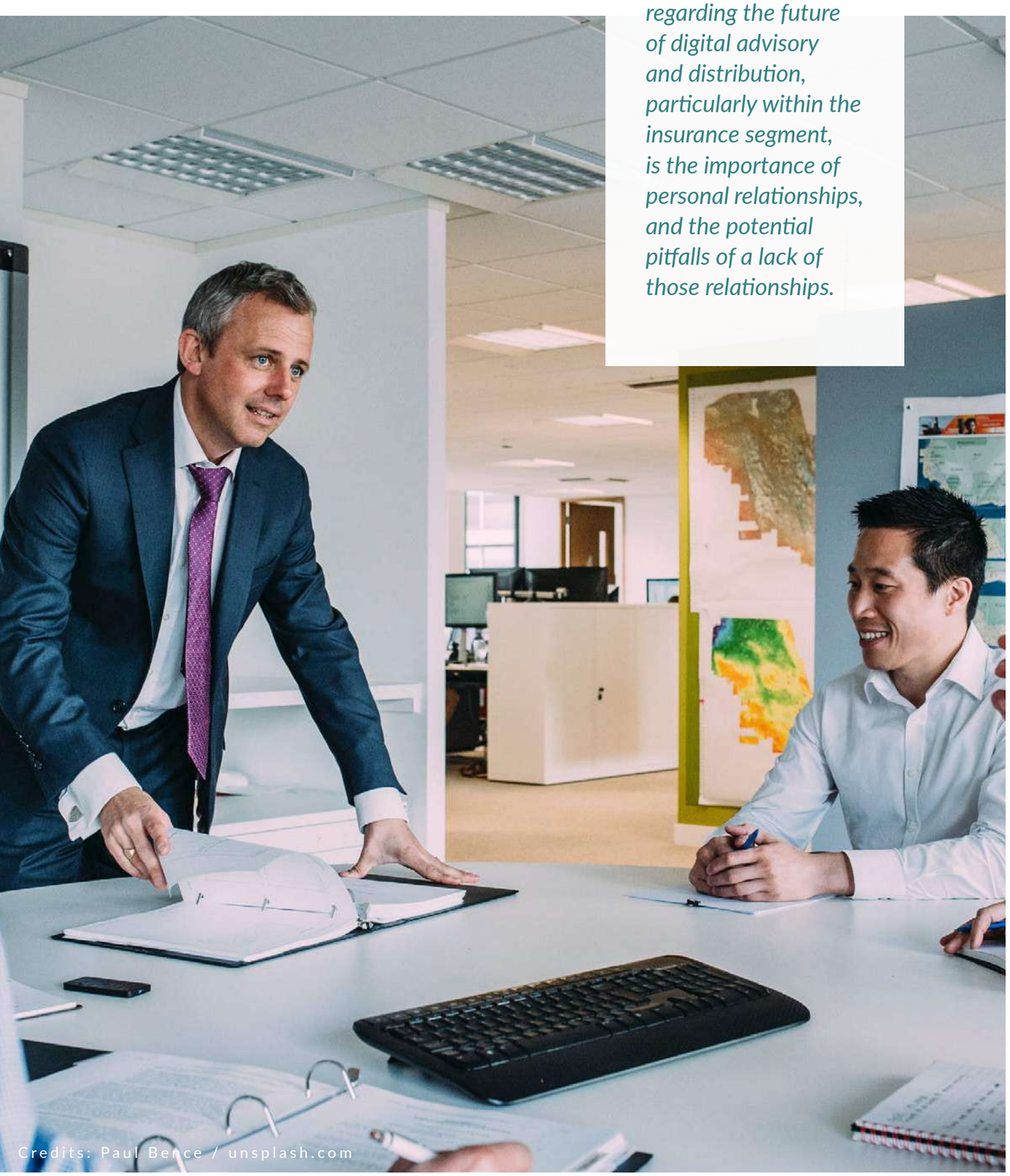
Whereas Sweden has produced several internationally renowned FinTechs, such as Klarna and iZettle, both with billion-dollar valuations, there are still no InsurTech unicorns in Sweden.
The largest InsurTech startup in Sweden, by valuation, is Bima Insurance, which has raised a total of USD74m to date (Crunchbase, 2017).

2.4 THE MAIN DRIVERS OF DISRUPTION

As discussed above, the insurance industry has traditionally been dominated by a select few incumbents. Currently, however, there are a number of core developments that are driving the pace of change in the insurance industry. Drawing from our above taxonomy developed together with PA Consulting, we will expand on some of the topics that we predict will change the insurance landscape, to illustrate the rise and growth of InsurTech, drawing from global examples and interviews with representatives of Swedish insurance and InsurTech companies.

The key to success for insurers is to make sure that they can meet their customers' needs both through digital and physical environments, with relevant offers and price points to serve differing needs.

However, one of the key concerns regarding the future of digital advisory and distribution, particularly within the insurance segment, is the importance of personal relationships, and the potential pitfalls of a lack of those relationships.



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DISTRIBUTION: DISRUPTING THE INSURANCE DISTRIBUTION MODEL

Arguably, one of the main areas of focus within InsurTech has been on change within distribution channel preferences. Catlin et al. (2017a) point to the disruptive potential of digitalization for the insurance industry, noting that particularly with regard to the new digital distribution channels that have developed over the last decade, the traditional insurance agent model could become less relevant in the near future.

A clear shift has been seen in the move from brokers to towards price aggregators. Future insurance distribution platforms will likely consider more aspects than just price when recommending products to customers. With a new generation of technology-savvy insurance clients entering the market, they are less likely to be loyal to one provider, and view policies and carriers as interchangeable as long as they offer the right solution in a convenient time and manner (Catlin et al., 2017b). Thus, a **scenario emerges in which risk carriers can plug into a common platform that analyses each customer's individual needs in real-time and switches policies as deemed necessary, enabling the policy holder to have the optimal coverage at any given time.**

In October 2017, Leif Eliasson, CEO of Moderna Försäkringar, noted, *The problem with price aggregators is that there is too much focus on the price of the insurance product. Insurance is more than just the price. It is only when you need to claim on your insurance policy that you understand the value of it. On the other hand, I believe that we will see new forms of insurance distributors that offer a more personalised insurance interface for tailored solutions that take more parameters into account than just the price.*

This type of disruption to the distribution model can be seen in other areas. Apart from the price comparison portals, such as Insplanet and Compricer in Sweden, there are also numerous robo-advisory startups, particularly within the Pensions category, which have started to emerge. They offer users intuitive pension investment overviews which reduce the need for traditional broker services for insurance and financial advice. The appetite for these services seems to be on the rise.

In 2016, the Swedish pensions Robo-Advisor, Lifeplan, managed over SEK13bn for 100,000 customers. It intends to grow its user base by offering better-performing and cheaper advisory services than traditional brokers to customers, mainly via its parent company Benify, an employee benefit portal that serves many of the largest organisations in Sweden (Leijonhufvud, 2016).

However, one of the key concerns regarding the future of digital advisory and distribution, particularly within the insurance segment, is the importance of personal relationships, and the potential pitfalls of a lack of these relationships. In October 2017, in a presentation on the future of insurance and pensions brokerage, CEO Gustav Rentzhog of Söderberg & Partners, a financial brokerage firm, presented some of the company's customer research findings. The study suggested that web-based advisor services yielded a negative net promoter score (NPS) of -28, whereas group advisory meetings and personal advisory meetings yielded positive net promoter scores of 37 and 58 respectively (Fredell, 2017). Thus, one may argue that personal meetings are still relevant and contribute to customer loyalty and business success.

The key to success for insurers is to make sure that they can meet their customers both through digital and physical environments, with relevant offers and price points to serve differing needs.

PERSONALISATION: ENTER THE FINANCIAL PARTNERS

In an era of ubiquitous connectivity, customers are more connected to their service providers through a variety of digital platforms than previously. The ease of access to information regarding new services and alternatives has substantially increased, likely leading to decreasing customer loyalty. The Gothenburg-based FinTech startup, Minatjänster, for instance, offers its users an intuitive overview of their subscriptions to services ranging from gym memberships to electricity bills and insurance policies, and suggests new services when and where it is able. These platforms, in essence, can be seen as distributors. But **a key difference to an insurance distributor is that the platform becomes more of a 'financial partner', following the users' consumption patterns and preferences, and acts accordingly**. Christer Braaf, CEO of Insurance Simplified, argues that insurance products differ from other consumer products in that the terms and conditions are more advanced, and it therefore becomes more difficult to communicate value other than through simple product features, such as price. Therefore, he predicts that customers will look for trusted partners that can guide them.

Insurers have an opportunity to invest in and partner with startups to better access and understand customer movements and tap into the technologies they use to provide better personalisation for their customers. Some traditional banks have already done this, and invested in financial partner apps – such as SEB and Nordea who invested in Tink (SEB, 2017), and Swedbank in

Minatjänster (Billing, 2017). The benefits of this investment strategy include, for instance, utilising data on customers' purchasing behaviours, thus enabling insurers to suggest appropriate products and tailor their offerings to better serve end-customers and increase customer satisfaction and loyalty.

RISK DETECTION AND RISK PREVENTION: FROM REACTIVE TO PROACTIVE INSURANCE

In parallel, we are seeing new digital insurance channels emerging with the aid of different technologies. With the ongoing development of Big Data analytics and artificial intelligence software, avenues for risk minimisation are emerging. Insurers can improve their underwriting, pricing, and risk selection processes by utilising predictive modelling analytics to proactively prevent accidents and reduce claims.

One example of this is the rise of telemetric apps and the Pay-as-you-drive (PAYD) insurance model. According to Svensk Försäkring (2016), motor insurance made up around 26% of Gross Written Premiums for the Non-Life segment in 2016, followed by 21% for Household and Homeowner insurance, making it the largest category for P&C in Sweden. Therefore, it is not surprising that insurance companies and InsurTech startups alike have tried to find ways to innovate within the category and win over customers.

In an October 2017 interview with Liselott Johansson, the CEO of Greater Than, she argued that motor insurance customers had a hard time understanding why their policies were priced in a certain way, and that there was little opportunity for them to impact their policies, regardless of their risk profile. Johansson stated that traditional motor policies are set up in a way in which risks are spread unevenly to the point where the less risky 80% of policy holders pay too much in relation to the most risk-prone 20% segment of drivers. However, with the aid of AI-driven connected car platforms, which Greater Than offers motorists, those drivers/customers who want to reduce the cost of their premiums have an opportunity and a method to do so.

Akin to the PAYD motor insurance, health monitoring IoT technologies can be used to incentivise life insurance policy holders to lead healthier lifestyles in order to reduce risks and therefore also reduce the costs of premiums. Recently, the US life insurer, John Hancook, provided an offer for its Vitality Life insurance policy holders. This was an Apple Watch priced at just USD25, as long as the policy holder accrued enough "Vitality Points" per month over a two-year period, based on the number of steps they walked, and various activities undertaken that they logged on the watch (Fingas, 2017).

Credits: Cooperation / Simon Paulin / imagebank.sweden.se

What these "new" insurance products have in common is that they constitute a closer customer-insurer relationship. The motorist is continuously informed about his or her driving behaviour, as is the telematics-enabled life insurance policy holder. The question again emerges whether insurance customers are comfortable or even incentivized enough to constantly be monitored by an insurance company. Will the change in price of the premium offset concerns regarding privacy and will there be a noticeable feedback mechanism regarding the way the premium is linked to their actions? As Leif Eliasson from Moderna Försäkringar argues, customers may just want to be covered and not have to think about insurance on a regular basis.

CLAIMS MANAGEMENT AND PROCESSING: THE AUTOMATED CLAIMS JOURNEY

As Susanne Bergh from Länsförsäkringar notes, it is during a claims process that an insurance customer truly uses the product he or she has purchased. And it is therefore crucial for this interaction interface to be seamless and pleasant, where each incident and customer will require a specific response. The claims management and processing element of the insurance chain is one of the key areas where technological disruption is likely to occur in the near future. Automation can reduce the costs of a claims process significantly, and Robotic Process Automation (RPA) software has already been integrated within the insurance industry for some time. These technologies will, however, become even more effective when they continuously learn from experience and adapt to changing circumstances through machine learning. Tractable, an AI startup in London that develops algorithms that learn and perform visual tasks, analyses thousands of images of damaged cars to assess whether a repair is necessary or not. This expedites the claims journey significantly and also leads to less ambiguity for insurance customers (Tractable, 2017).

Artificial Intelligence can also help reduce the claims journey significantly. Lemonade, a digital insurer mentioned previously, utilizes its chatbot, and 'Maya', recently settled a claim in less than three seconds (Sun, 2017).

However, there is a difference in how claims processes are managed, based on the severity of the injury or accident. Fredrik Wahlström from Folksam claims that the downside of the digital claims management that companies – such as Lemonade, a P&C InsurTech in the US – are offering, is that when customers enter a dispute or learn that they do not have coverage for a particularly difficult accident, they become swiftly dissatisfied with their policy provider.

In these situations, traditional insurance companies are careful to ensure that these customer interactions are as convenient and appropriate as possible. Many of the current InsurTech companies focus on ways to utilize technology to, for instance, simplify the claims process for smaller accidents such as losing a mobile phone. The claims process for a burned down house is a different interaction where traditional insurance companies, particularly the Swedish incumbents, are skilful. This is an area where we at Folksam are working hard to become better in terms of customer relationship management.

Thus, striking a balance between integrating automated claims processing software to free up resources and reduce costs and offering and support via personal communication channels, perhaps in the wake of a difficult incident is key to retaining customer satisfaction and loyalty.

AI-powered claims systems can also help reduce the incidence of fraud by analysing claims patterns and better identifying fraudulent claims, instead of relying on human case officers wading through piles of documentation to find offenders.

Insurance companies have an abundance of data, which is essential for successful AI systems. Therefore, tapping into technologies that can better analyse claims patterns could lead to a better customer experience, as well as reduce costs attributable to fraudulent claims and increased operating costs.

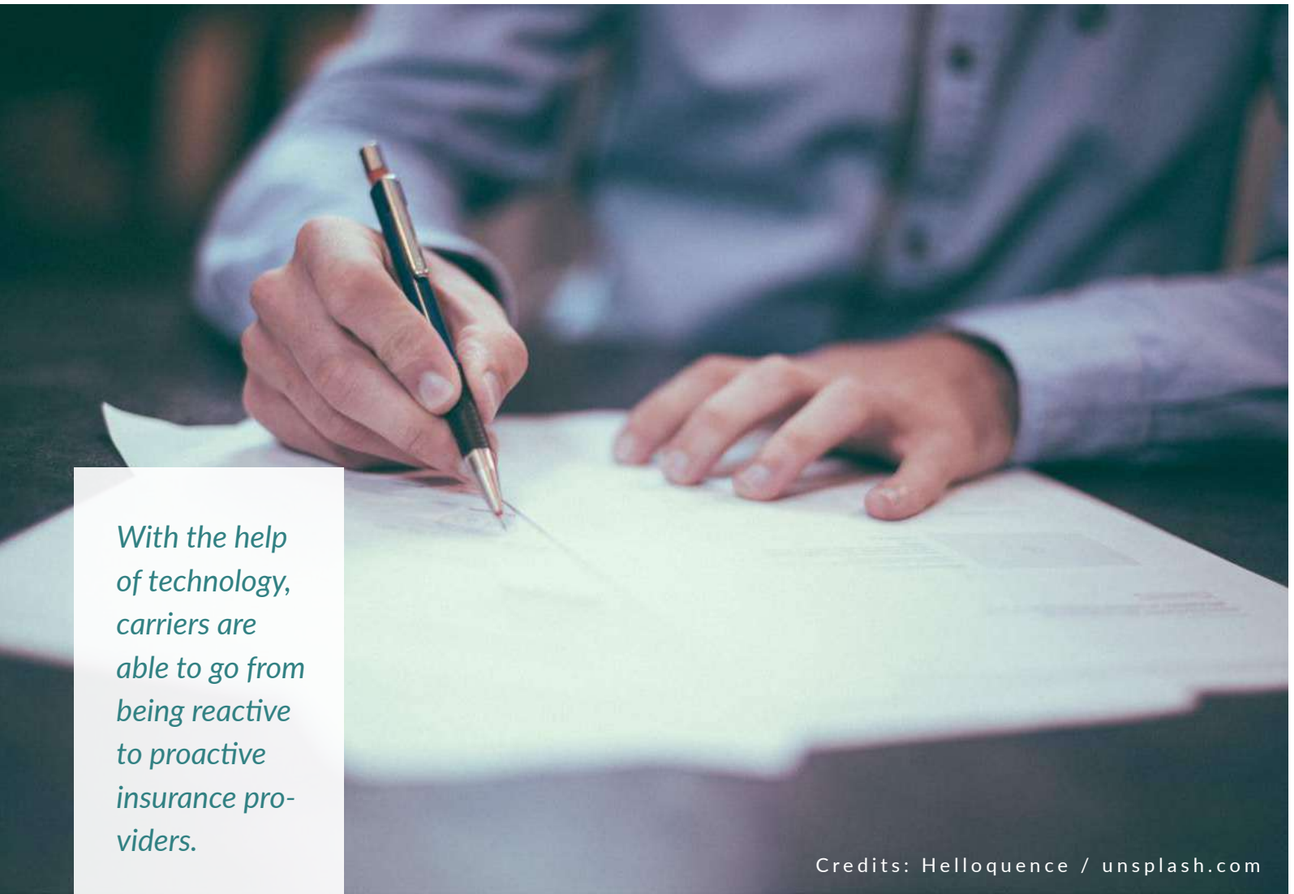
UNDERWRITING AND REINSURANCE: TRIMMING DOWN THE EXPENSE RATIO

During our industry expert interviews for this project, many interviewees suggested that traditional risk carriers will likely always have a role in underwriting in the insurance industry, regardless of where disruption occurs. To be a risk carrier – as an underwriter or reinsurer – is a complicated undertaking due to regulatory compliance, large capital requirements and often hundred year-long contracts. According Fredrik Wahlström, Chief Architect and Head of Enterprise Architecture at Folksam, it is fairly certain is that while traditional insurance companies will lose some of their customer relationships, they will maintain a central role in the insurance value chain.

One particularly interesting area for InsurTech is within underwriting and reinsurance. As Ranvir Saggu, CEO of the Blockchain InsurTech startup Blocksure, argues, the growth of artificial intelligence, the Internet of Things, and big data analytics will allow for companies to offer more personalised policies that are tailored to individuals, rather than customers being lumped into risk groups by brokers, which according to Saggu, translates to customers "subsidising other people" (Riddy, 2017). Furthermore, **like in banking and finance, many incumbent insurers are burdened by what some would consider outdated and inefficient IT systems.** Often, this is coupled with a hierarchical and slow-moving organisational structure that hampers the fast decision making and IT innovation that is necessary to keep pace with the growing cohort of small and nimble startups. This is where industry collaboration between incumbents and InsurTech IT providers who can fill the technology gaps emerges as a viable option.

As Altus, an insurance consultancy puts it *With legacy business comes legacy technology, and with legacy technology comes legacy process and complexity that restrains the business from moving quickly and being able to adopt new ideas* (Altus Consulting, 2017, p.15). According to their study, established insurers operate an expense ratio of 25-35%, whereas new players, such as Lemonade operate at a 10% expense ratio. In other words, there is reason to be responsive to the developments within InsurTech as this is where InsurTech startups can offer incumbents new solutions to tackle legacy system hurdles and help innovate quicker on customer offerings and reduce costs at the back-end.

One example of a startup in the Swedish market that is helping incumbents with this is Itello, that develops business systems and digital solutions for the pension and life insurance industry.



With the help of technology, carriers are able to go from being reactive to proactive insurance providers.

Credits: Helloquence / unsplash.com

Their flagship product 'Inca' helps insurers administer policies for pensions, insurance plans and long-term saving products and instead of fully migrating data from insurers' platforms to the Inca platform, the company mirrors the information so that it can be better accessed and analysed.

This is due to the fact that a full migration of data to a new platform can take upwards of five years to complete and entails a high degree of security and planning to ensure a successful process. Thus, mirroring the data from the original platform to Itello's platform enables their customers to better manage their policies while simultaneously safeguarding continuous operations.

According to Henrik Allert from Itello, one of the key difficulties in increasing the pace of innovation in the insurance industry is the fact that the industry is very conservative. *Our main competition when we are out selling our products to new customers is not technology companies offering new solutions, but customers having developed their own systems and deciding to continue to use these systems.*

In order for insurers to remain competitive in the mid to long-term, it is critical that they assess their IT infrastructures and invest in programmes or partner with technology providers to ensure that their IT systems accommodate new digital and avoid adding additional complexity to their operations and increasing their operating costs.
Whereas newcomers are relatively unburdened by legacy systems and operations, they often lack the underwriting expertise to price risks effectively. Here, again, an opportunity for partnership emerges for incumbents and startups to collaborate, by marrying the incumbents' underwriting extpertise, with the startups' abmitions to leverage new technological capabilities such as big data analytics to overcome legacy hurdles, price risks better, and reduce operating costs.

ON-DEMAND INSURANCE: THE GREAT UNBUNDLING

With the continued triumph of the smart phone as one of the most important devices and tools for people across the world, insurance customers are becoming increasingly receptive to using new technologies to interact with their service providers. One example of this trend within P&C insurance is the 'componentisation' of insurance policies. Instead of having a homeowner's insurance cover everything in the house, customers may want to insure specific items at the point of purchase, or even at a later stage.

Having an online interface where the customer can get an overview of the items insured is a way for providers to interact with their clients in a setting that they have become used to in many other sectors, notably within mobile banking. A Swedish startup that is currently working on componentisation of insurance items is Safestuff. Through a mobile interface, users are provided with an overview of their items and can find appropriate insurance policies to fit their needs.

In parallel to services that offer overviews of insurance items, an increasing number of retailers are integrating item insurance policies at their online checkouts. For instance, Elgiganten has integrated an item insurance policy from Moderna Försäkringar to insure electronic goods, and Ving has partnered up with Gouda for an integrated travel insurance policy. The question that therefore remains is how relevant the all-encompassing homeowner's insurance policy will be, when customers can get coverage for specific items and for specific time periods. Leif Eliasson from Moderna Försäkringar thinks that, *Even though some clients may want to have specific insurance policies for items and activities, many value simplicity and like their insurers to just take care of their policies.*

Again, the challenge remains of how to offer the right policy at the right time, but simultaneously maintaining the simplicity of a full-coverage policy.

In September 2017, Susanne Bergh, Head of Customer and Channels at Länsförsäkringar, pointed to the challenge that Swedish insurance companies face as sharing economy platforms become more commonplace:

When autonomous cars get more common and car ownership declines, the car pools that offer these transportation services are not going to appoint a Swedish insurance company to cover their fleets. They are most likely going to partner with one of the international re-insurers, such as Swiss Re or Munich Re.

CONSUMER COMMUNITIES: REINVENTING MUTUAL INSURANCE

Another development within the insurance landscape is the re-emergence of the peer-to-peer (P2P) insurance model. The notion of mutual insurance is essentially how modern insurance as an innovation came about in relation to cargo insurance policies traded between small parties in the early 17th century in London. As mentioned previously Sweden has a tradition of mutual insurance, with Länsförsäkringar and Folksam arguably

being the most prominent mutual insurance companies in the Swedish market. However, the P2P models that are emerging today differ slightly from the customer cooperatives that are owned together by all the policy holders.

The new models rely on smaller groups of people that join together to reduce the costs of their premiums. An example would be a group of neighbours who all agree that they are reasonably careful and law abiding people who rarely need to claim on their policies due to any recklessness. If this group joins together and shares some of the risk amongst themselves, they have a chance to lower their premium in comparison to those pools that include a much broader group of people with differing risk profiles, such as would be found in the customer base of a traditional insurance company.

P2P InsurTechs are forming across Europe. In Sweden, the startup SplitEx is currently piloting the business model; in Germany, Friendsurance was founded in 2010; in the UK, a number of startups have entered the market. Gaining access to individuals to form a pooling group is one of the challenges that is clearly present and startups have entered this information provision field as well. One example is Bought By Many, a platform that moderates a list of interest groups, such as pet insurance, sports insurance, and travel. The business model works as follows: a group joins together and pays a certain percentage, for example 20%, of their annual premium into a common pool that is exclusive to the group. The rest is paid to a traditional insurance company that acts as a "re-insurer" to the group and is used in the event of large incidents that the private pool is not able to cover. By the end of the year, the group reviews the funds remaining in the common pool and decides to pay back to the individuals or use the funds for other common purposes.

For insurers in Sweden, **the concept of mutual insurance is not new, and yet the challenge remains as how to properly distribute risk and not end up in a scenario where some customers are left uninsurable**.

Although consumer communities will help some customers better price risk and access cheaper and more suitable insurance products, it is unlikely that regulators will allow such practices to become a new standard in the industry. Data usage and protection regulations will likely impact the development of InsurTech and in particular for risk assessment practices and P2P insurance products (OECD, 2017b).

CUSTOMER ENGAGEMENT: TAILORED CUSTOMER COMMUNICATION IN REAL TIME

With the help of technology, carriers are able to go from being reactive to proactive insurance providers. **This is in line with meeting customer expectations in other industries, such as the travel and financial services industry, to name a few.**

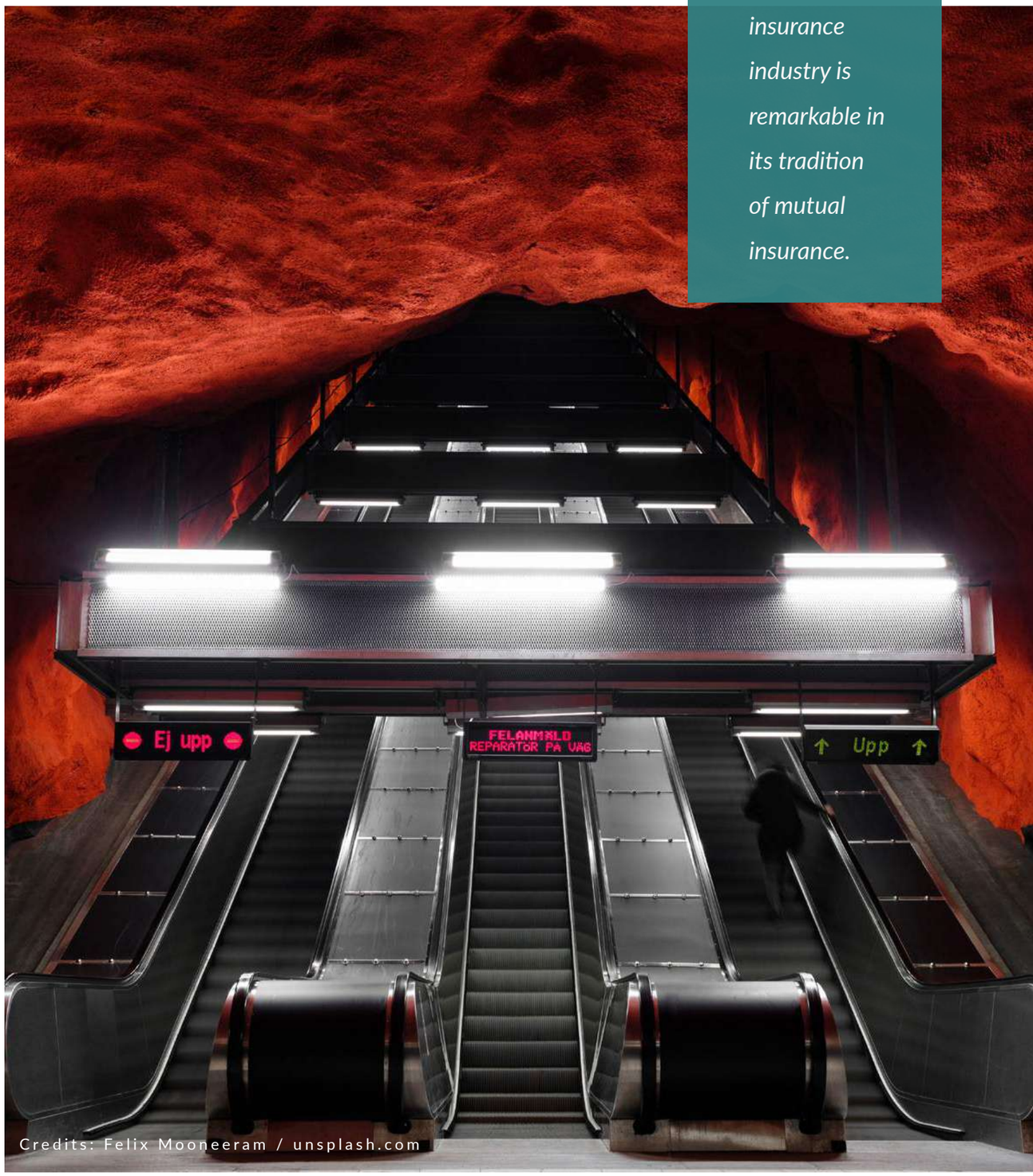
According to Liselott Johansson from Greater Than / Enerfy, customers have said that they want to be made aware of traffic risks and ways to reduce them well before any motoring accident happens. This not only saves lives, lowers premiums, and engages the client, it also reduces claims costs. Therefore, it is in the interest of both customers and providers to find ways to prevent injuries and be proactive. The same logic applies to the Life Insurance vertical, where IoT devices, such as health trackers, can be utilised to promote a healthy lifestyle, as mentioned previously.

Henrik Allert, Head of Digital Solutions at Itello, argues that insurers can retain and nurture their client relationships by becoming more proactive. By sending policyholders information about their health data and offering incentives to maintain a healthy lifestyle, the result could be better customer value and reduced claims risks.

Furthermore, insurers can utilize data analytics and multi-channel communication platforms to tailor their communications to customers based on individual preferences. For instance, by analysing customer demographics and behaviours, insurers can predict which communication channel, message, and timing will yield the most positive customer response, and therefore increase customer loyalty and retention. Wiraya Solutions, a customer communication platform, has worked together with IF Försäkringar to improve customer loyalty by tailoring their customer communication based on preferences, increasing their communication reach by 97% and customer action by 24% (Wiraya Solutions, 2017).

With the advent of AI technologies, customer engagement can be optimised based on preference and different success metrics in real-time to accommodate the ever-increasing pace of change in consumer preferences.

The Swedish insurance industry is remarkable in its tradition of mutual insurance.



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2.5 THE SWEDISH INSURANCE MARKET AND INSURTECH INDUSTRY

When looking at the Swedish insurance market and the market opportunity for InsurTech, it must be recognised that the sector is still relatively small. According to an industry dossier by Statista, Sweden only made up 1% of the total Insurance Tech deals made worldwide in 2016 (Statista, 2017b) with the United States (59%), Germany (6%) and the UK (5%) leading the pack.

Within the Swedish insurance market more generally, as of 2016, the industry organization Svensk Försäkring, reported that there were 355 companies generating SEK309bn in written premiums. The market is characterized by a small number of large incumbents that enjoy a large profit share.

Within the Property and Casualty (P&C) segment, the five largest players shared 83% of the total market, whereas the five largest players in the Life segment shared 60% of the total market (Svensk Försäkring, 2016).

Nonetheless, it is not only market size that dictates the potential of a market. The Swedish market is characterized by a high degree of internet and computer literacy, with a population that is seen as high-tech early adopters and a strong network of startup companies operating within the financial services sector (Skog et al., 2016).

An article by the Swedish Insurance industry journal Sak och Liv points to the fact that the Swedish insurance industry hampers InsurTech companies' domestic prospects due to the market's relative maturity and its domination by a few established players.

The article quotes Kevin Jiang, who has extensive experience of the Swedish insurance industry, who argues that Swedish **InsurTech companies have two strategies to become successful: they can either start out as a 'born global firm', quickly expanding elsewhere, or they can utilise the Swedish market as a pilot case to test their technologies in collaboration with incumbents, and ultimately expand to other markets** (Loxdal, 2017).

The Swedish insurance industry is remarkable in its tradition of mutual insurance. Arguably, many of the so-called P2P platforms that are developing today are really repackaging the notion behind a managed mutual insurance platform, similar to that which the P&C insurers Länsförsäkringar or Folksam, or the life insurers Alecta and Skandia are offering customers today.

SWEDISH INSURTECH MAPPING

As exemplified by the numerous ways of categorising InsurTech presented previously, it is difficult to fully capture all facets of the InsurTech value chain with one method, as the categories are sometimes overlapping and thus yield different landscapes. However, to visualise the Swedish InsurTech scene, we will utilise the taxonomy used above to describe the InsurTech landscape with eight categories (see figure 7).

During the course of our data collection process, we identified 31 companies across Sweden that either fully or in some capacity fall under the InsurTech definition. In the figure below, we aim to map out the startups operating in the Swedish market at the time of writing. It should be noted that the landscape is ever-changing and continuously evolving with new companies emerging and others disappearing.

Figure 7. SSE & PA InsurTech Taxonomy

2.6 FUTURE OUTLOOK

International Outlook for InsurTech

For the past few years, the US and Europe have been dominant in attracting InsurTech investments globally, as these regions traditionally own the most mature and robust insurance markets. According to a study conducted by KPMG in 2017, venture capital (VC), private equity (PE) and M&A delivered more than an aggregated USD12bn in venture investment, through 274 deals, to the global InsurTech sector, representing an almost threefold growth from the previous year (KPMG, 2017). In terms of geographical distribution, 60% of all investments were registered in the US, followed by Germany, the UK and China with 5-6% market share each, while the remaining investments in the top 10 countries were hosted by India, France, Canada, Brazil, Japan and Sweden, the latter of which holds a 1% global market share (CB Insights, 2017a).

Although the US and Europe are likely to continue to dominate InsurTech development in the coming years, the Asian InsurTech market is steadily picking up. According to a study by LMG and BCG, the Asian insurance market achieved a significant 9% annual growth rate between 2013 and 2015, the highest in any region, despite the Asian regulatory environment remaining very fragmented, changing from country to country and making it difficult for InsurTech companies to gain market share. In September 2017, the very first IPO offering in the history of InsurTech took place in

Hong Kong as noted previously, with ZhongAn Online Property & Casualty Insurance raising USD1.5bn (Weinland and Ralph, 2017b).

Not surprisingly, 2017 has been a dynamic year, witnessing a positive continuation of investments with 155 closed deals globally during the first half of the year, albeit this was a lower level of deal value compared to the same period in 2016. The first quarter of the year was dominated by two major deals, with the UK-based Gryphon Group Holdings and the Stockholm-based BIMA, attracting USD229m PE funding and USD55.2m VC funding, respectively. The second quarter ended on a record high, both in terms of invested capital and the number of closed deals (KPMG, 2017).

These two deals illustrate the momentum Europe is gathering in the InsurTech market, which has been dominated by London, the global capital of InsurTech investment. Although there are obvious concerns and uncertainties around the post-Brexit economy, the UK has gathered USD280m in InsurTech investment in the first two quarters, almost 30-times more than in the first half of 2016, taking well over a third of the European market share. London itself accounted for more than 30% of all InsurTech deals across Europe, followed by Berlin and Paris, each claiming 10% of European market share. Other important European markets include Stockholm, Edinburgh, Zurich and Munich, with 10, 6, 4 and 3 % market share, respectively.

Cloud computing, IoT, and Big Data technologies have been the winners so far in 2017, attracting investments from InsurTech companies. More than USD260m of investment went into cloud computing technologies alone, making it the most popular investment target in the sector (Accenture, 2017).

Opportunities and Challenges

Disruption will continuously evolve in the insurance sector, bringing permanent changes to market players, business models, transactions and eventually profit distribution. The question is not who will be affected by disruption, but rather who can move quickest from being reactive to proactive.

At the end of 2015, the World Economic Forum concluded that 'insurance disaggregation' and 'connected insurance' would be at the core of global InsurTech development. To name a few trends, the sharing economy will dominate the sector, distribution will go digital, and IoT and advanced sensors will automate traditional data collection and transmission (Deloitte, 2015). Innovative technologies and easier access to customers and information through the sharing economy and connected lifestyles will disrupt traditional economy of scale. Incumbents will be under constant pressure to innovate to keep up with technology-enabled newcomers, who will take every opportunity to exploit customer friction and gain profit margins.

However, from an institutional perspective, both incumbents and InsurTech companies will face the hurdle of integrating various innovative technologies within their systems. For instance, the exploitation of automation and AI will require data standardization across autonomous systems to align communication intra- and inter-company (Capgemeni, 2017). For incumbents and newcomers who plan to join forces, this will come on top of the main challenge of adopting to each other's corporate structure, management style and IT infrastructure (Eiopa, 2017). While incumbents will have to invest in upgrading their IT systems and internal processes, InsurTech companies will have to adapt to a complex regulatory environment, which traditionally is more of a comfort zone of incumbents.

Sophisticated data protection and cybersecurity systems, required by new regulations like the General Data Protection Regulation (GDPR), cannot be an add-on function to existing data handling systems. They must be implemented from the beginning and be at the core of information and data management systems, and be seamlessly aligned with the digital strategy of each company.

When it comes to the technological arsenal of InsurTech companies, blockchain, AI, machine learning, Big Data analytics, robo-advisors and IoT have been joined by Augmented Reality (AR), a less frequently talked-about technology already on the drawing board of InsurTech startups and a few incumbents as well. AR links a live feed of the physical, real world environment with an overlaid computer-driven augmentation, such as graphics, sounds, video etc. Through its demonstration capability in a real-life environment, AR has potential as a powerful marketing tool to be used for explaining about products, services, potential dangers and risks, as well as prevention methods and countermeasures in home and business environments. Not surprisingly, another application area of AR will be in claim processing, allowing insurance companies to inspect property damage in a precise manner (Capgemeni, 2017).

Changes are also expected to come in the product portfolio of both incumbents and InsurTech companies. Complementing traditional insurance and re-insurance products, more players will tap into emerging and non-traditional sectors, such as policy offerings against cyber or terrorist attacks. These might remain a niche segment, but even the core product portfolio will look different in the future. Car insurance packages will change as a result of the decreasing number of accidents and collisions due to intelligent navigation systems and inter-connected vehicles. In the mid- and long-term, even the financial burden of insurance will shift from the car-owner to the manufacturer when more autonomous vehicles are operating on the roads (Deloitte, 2015). This is only an example of the transformation expected to happen in one segment of the insurance market, but technology-triggered disruption will impact all other market segments.

2.7 INSURTECH CONCLUSION: AN OPPORTUNITY FOR INDUSTRY COLLABORATION

Swedish incumbents and InsurTech startups have reason to be optimistic about the future of the insurance landscape. For the startups, there are signs of increased risk capital that is accessible by the market, and customers, both within B2C and B2B, are on the lookout for more personalised, proactive, and cheaper insurance products.

It is unlikely, at the current stage of InsurTech development, that new entrants will be able to competitively offer a full insurance product, without the aid of incumbents and/or partners. This is due to the high capital requirements and complex regulatory compliance hurdles, as described above, but also the disadvantage of newness that hampers consumer trust. Therefore, a scenario emerges where incumbent insurers and newcomers can co-exist to improve service quality, reduce cost, and generate returns on investment by partnering and cooperating.

The Swedish insurance market offers an attractive breeding ground for industry collaboration based on the increasing number of InsurTech startups, investor demand for innovative startups to invest in, and incumbent insurance companies with extensive knowledge and experience.

Sweden not only hosts InsurTechs that operate within the Swedish market, but an increasing number that look beyond Sweden as their main market, such as BIMA Mobile and Enerfy.

With nimble operations and global perspectives, these companies aim to establish themselves as partners and providers of technology services that transcend national boundaries. Stockholm, as well as other cities in Sweden, are well-positioned to host technology companies that can innovate in the insurance industry.

For incumbents, it is vital to participate in these developments to accommodate future insurance customers, who will demand proactive, personalised, and intuitive insurance products. Whereas incumbent insurers have already started to partner with startups in a selection of areas, they still face challenges in reinventing themselves for future policy holders. Further collaboration with InsurTech startups may prove a viable solution.

The new sets of regulations seek the commoditization of financial services, which is achieved through transparency.

Credits: Jon Flobrant / unsplash.com

3. REGTECH

3.1 INTRODUCTION

The role of a regulator in finance is to ensure the effective functioning of the market. This means that the regulator's mandate is to guarantee consumer protection, market integrity, and competition. However, the three concepts are not always complementary, as both consumer protection and market integrity tend to come at the expense of competition. As a result, the financial services industry is characterized by high-entry costs and a lack of innovation when compared to other industries. For instance, in 2016, the financial industry, which amounts to 6% of global gross domestic product (GDP), spent less than 1.5% of global R&D expenditure (OECD, 2017a; Statista, 2017a).

Regulators, thus, aim to find the right balance between the three pillars. They are conscious of current events and the changes resulting from them, such as the implications of the 2008 financial crisis, and are willing to modify certain regulations to improve the financial system (When RegTech meets FinTech - Sibos, 2016). The new set of regulations look to commoditise financial services through greater transparency. The transparency framework is a key measure to enable specialised and cost-effective firms to gain a market presence.

For example, MiFiD II, which is going to be implemented in January 2018, increases the pre- and post- transparency requirements requiring Financial Institutions (FIs) to disclose their fees. The regulation aims to create a competitive market by proving consumers with the right information to evaluate financial services providers. In the long term, investors will use this information to reward those FIs that offer the best services at the cheapest price, increasing the overall efficiency of the financial market.

The increasing role of new technologies in the financial market requires FIs to re-evaluate the services offered and focus on those services in which they have a competitive advantage. Since the technology sector is characterized by large fixed costs and small variable costs, economies of scale are expected to play a vital role in the future. **This disruption does not mean that FIs will lose their presence in the market: it is likely they will remain competitive in certain aspects, such as services that require trust.** However, FIs should evaluate what parts of their services and operating processes can be outsourced to more efficient technology companies so they can stay competitive in the long term. In this report, we examine how new regulations are affecting FIs and what technological solutions are available to them. It is important to highlight that the RegTech industry still in its nascent stage and not all solutions are perfect. For that reason, we recommend that FIs cooperate with RegTechs and participate in the development of this exciting new industry.

The long-term consequences of these regulations, if firms can take advantage of economies of scale, is a horizontally integrated financial industry characterized by digitization and built on a Lego type structure.

3.2 REGTECH BACKGROUND

Although the term RegTech was already in use in the early 2000s, it became popular only after the UK Treasury published the 2015 Budget. In the report, HM Treasury highlighted the importance of RegTech in enhancing the FinTech sector.

Interestingly, RegTech is described as a complement to FinTechs and not to incumbents, albeit its facilitation would be supported by the regulators. As of 2017, most RegTechs act as a bridge between established financial institutions and regulatory bodies.
As we can see in Figure 9, soon after the UK published the 2015 Budget, the number of searches for the term RegTech rose substantially and continued to increase through to May 2017.

Furthermore, most of the searches were conducted from countries characterized by their financial hubs such as Luxembourg, Singapore, Hong Kong and Switzerland, indicating a strong interest from established players.

IMPROVING ACCESS TO FINANCE AND MARKETS

1.204 (...) The government wants the UK to be the world's leading FinTech hub, and is now taking steps to support innovation across the whole of the UK while safeguarding financial stability and consumer protection. In support of this, this Budget announces that:

- the Financial Conduct Authority's (FCA) 'Project Innovate' will work with HMT and the Prudential Regulation Authority (PRA) to investigate the feasibility of developing a regulatory 'sandbox' for financial services innovators
- the FCA, working with the PRA, will also identify ways to support the adoption of new technologies to facilitate the delivery of regulatory requirements – so-called 'RegTech'

Figure 8. UK Budget 2015. Source: HM Treasury (2015)

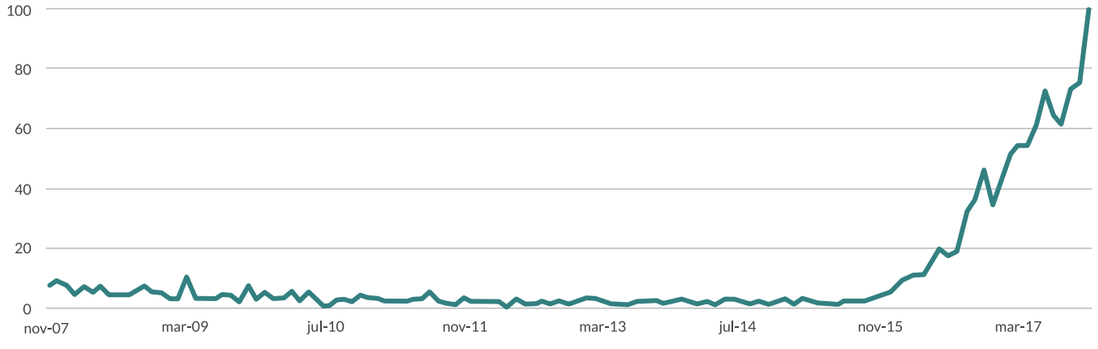


Figure 9. Number of Google Searches for RegTech. Adapted from Google (2017)

[1] The Y-Axis represents the relative frequency of the searches compared to its highest

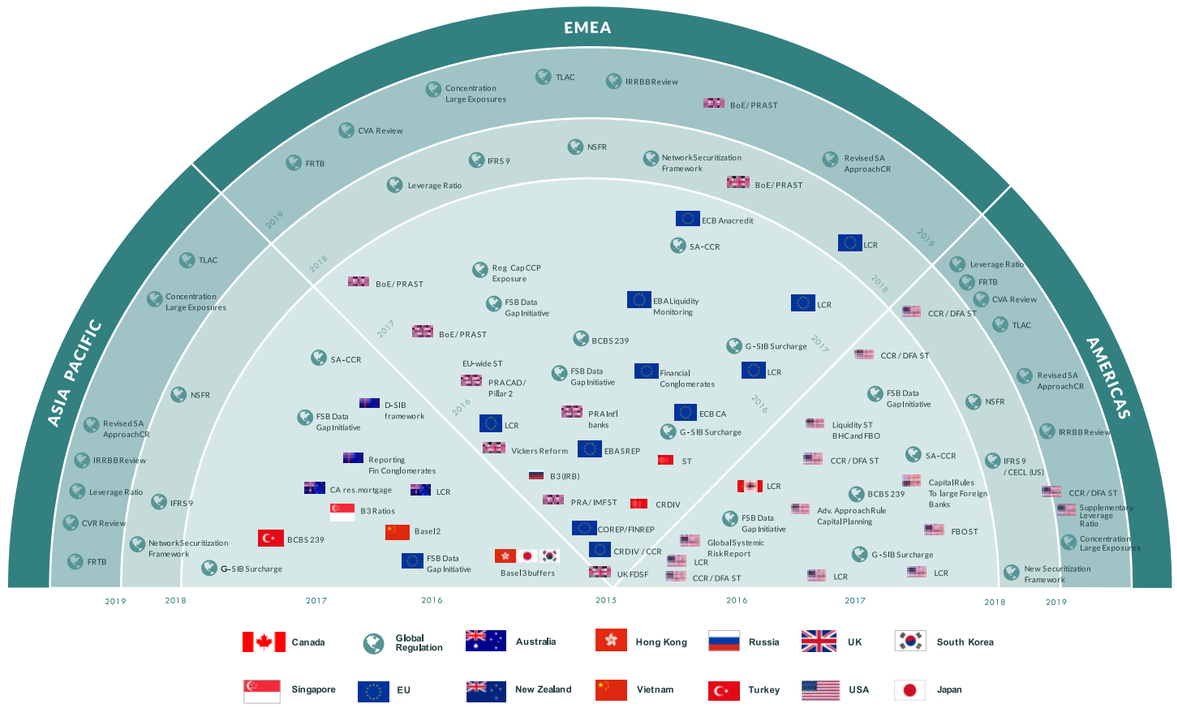


Figure 10. Global Banking Regulations. Adapted from Moody Analytics (2015)

3.3 REGTECH DEFINITION

David Geale, the Director of Policy at the UK's Financial Conduct Authority (FCA), defines RegTech as, "the interface between the regulators and firms" (When RegTech meets FinTech - Sibos, 2016) while the Institute of International Finance (IIF) defines it as, *the use of new technologies to solve regulatory and compliance requirements more effectively and efficiently* (Institute of International Finance, 2016).

We define it as a combination of both: **RegTech is the interface between regulators, firms, and consumers, which uses new technologies to solve regulatory and compliance requirements more effectively and efficiently.**
Although the term involves many different industries, this section mainly focuses on RegTech within the financial industry.

3.4 THE RISE OF REGTECH

In response to the 2008 financial crisis, the G20 began a debate in 2009 on the need to devise new financial regulations for systematically significant financial institutions (SIFI's) (Kirton, 2010). This was followed up by a new set of regulations that incrementally introduced the regulatory and compliance requirements. Figure 10 attempts to illustrate most of the regulations that were put in place and are expected to be enforced between 2015 and 2019.

The figure does not include every regulation that affects financial markets: however, it serves to illustrate a global trend towards a more regulated financial market. To put things into perspective, in 2015 HSBC already had more than 7,000 employees working in the compliance department – that is, before these regulations were put in place (Laura Noonan, 2015).

The trend was supported by a set of hefty fines imposed on FIs for breaching the law. For instance, from 2009 to 2015 the US government imposed fines amounting to USD204 billion (Jeff Cox, 2015). Sizeable fines in Europe were imposed on Credit Agricole, HSBC and JP Morgan Chase, and amounted to EUR485 million (European Commission, 2016).
Thus, we can infer from the previous figures and data that Europe and USA have increased the number of regulations and are willing to issue large fines to financial institutions. As a result, the **financial industry, characterized by its high levels of competition, has started a new race to ease the burden of compliance costs, which is essential to effectively increase operational activities.** We can therefore conclude that RegTech is a demand-driven industry as the new regulations raise the demand for technological solutions.

3.5 REGTECH INVESTMENTS

Since 2012, USD2.99 billion has been invested in RegTech startups. Figure 11 shows the investments made between the start of 2012 and the end of 2016, and the number of deals.

The number of deals has increased over time and the investment value peaked in 2014 at USD867 million. Furthermore, over 40% of these investments were made in early-stage companies. Avara, a tax management company, received the largest amount of funding, USD253 million.
Of the deals, 78% were made in United States, 9% in the UK, and 3% in Canada. Salesforce venture, the venture capital arm of a customer relationship management (CRM) platform, was one of the largest investors, investing over USD40 million in Skyhigh, which was later incorporated into the salesforce AppExchange delivering Audit, Compliance and Governance Solutions.

Among FIs, Santander, Barclays and Goldman Sachs stand out by investing in companies such as ChainAnalysis and Elliptic, two Blockchain startups specialized in tracing Bitcoin and revealing money laundering schemes. Corporate investment has also increased over time, from

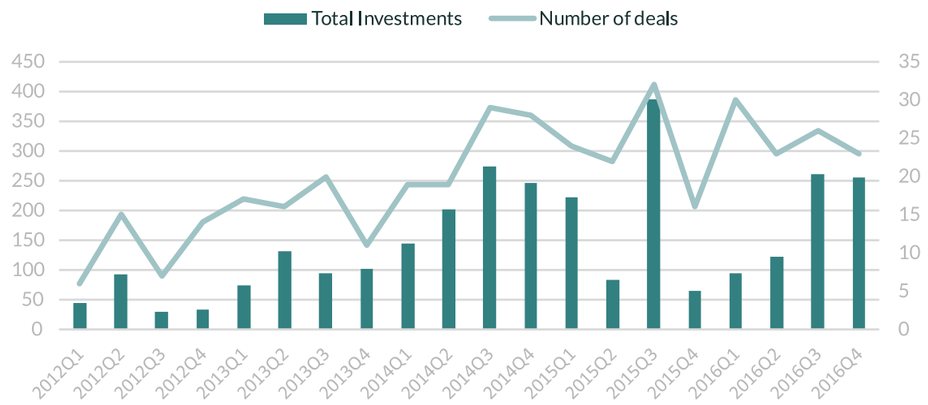


Figure 11. Total Investments. Source: Adapted from CB Insights (2017c)

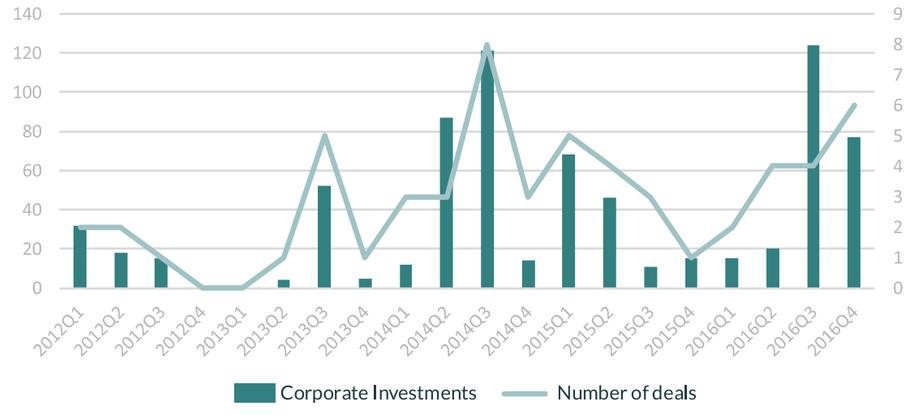


Figure 12. Corporate Investments. Adapted from CB Insights (2017c)

USD65 million in 2012 to USD236 million in 2016 (CB Insights, 2017c).

Further, the RegTech industry has experienced an increasing number of exits through M&A, peaking in 2016 with 29 M&As. Figure 13 exhibits a timeline of exits from January 2016 to January 2017. These figures demonstrate that **RegTech has experienced strong growth in recent years.** Moreover, the large number of exits through M&A exhibits that there have been successful seed investments and strong interest from established players.

The next section explains how upcoming regulations are affecting incumbents and the solutions available in the market.

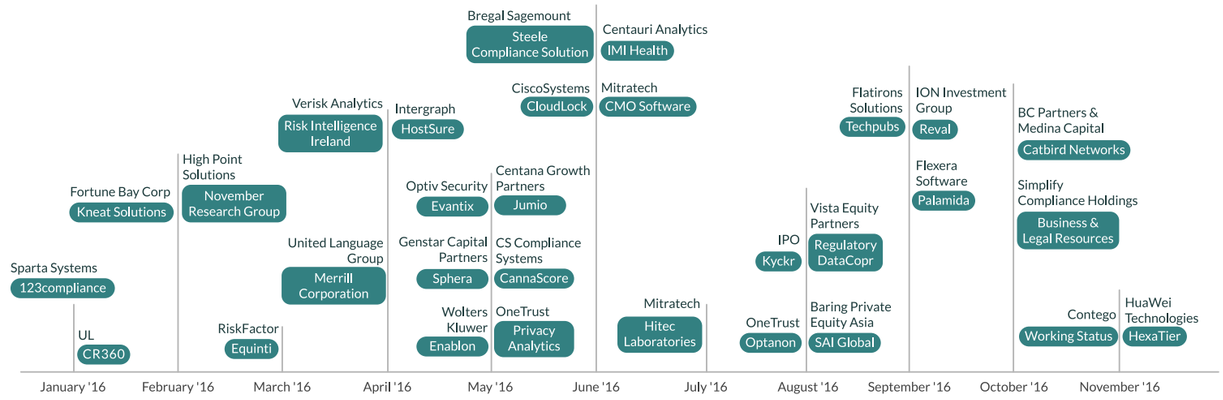


Figure 13. Mergers and Acquisitions. Adapted from CB Insights (2017c)

	DESCRIPTION	WHAT THEY OFFER
1	Risk Data Aggregation	Solutions for traditional financial and risk reporting including how to aggregate and reconcile data.
2	Financial Crime	Solutions for managing KYC and AML together with new technologies.
3	Transaction Reporting	Solutions for collecting, disseminating and reporting transactions with shorting intervals according to the new requirements.
4	Conduct and Market Integrity	Solutions for detecting insider trading and market abuse.
5	Monitor and Detect	Solutions for monitoring and detecting fraud in all channels. This include using AI based solutions for audio analysis.
6	Data Management and Technologies	Solutions for Master Data Management, Definitions, Standards and Data technologies.
7	Actor Management	Solutions to handle customers, counter parties and other actors.
8	Internet of Things	Enable data collection via smart devices.
9	Regulatory Requirements Management	Solutions for responding to regulations.

Table 3. Taxonomy of RegTech

3.6 TAXONOMY OF REGTECH

Due to the nascent stage of the RegTech industry and the large numbers of upcoming regulations, companies have not yet reached a consensus on its taxonomy. Through a careful examination of the regulations impacting Financial Institutions in Sweden, we have derived the following taxonomy below (Figure 14).

In order to provide a clear view on how new technologies interact with recent regulations we have described specific regulation within each section that affects financial institutions and identified RegTechs that solve those compliance issues.

The document is not intended to refer to specific company but to exhibit the relationship between new technologies and regulations.

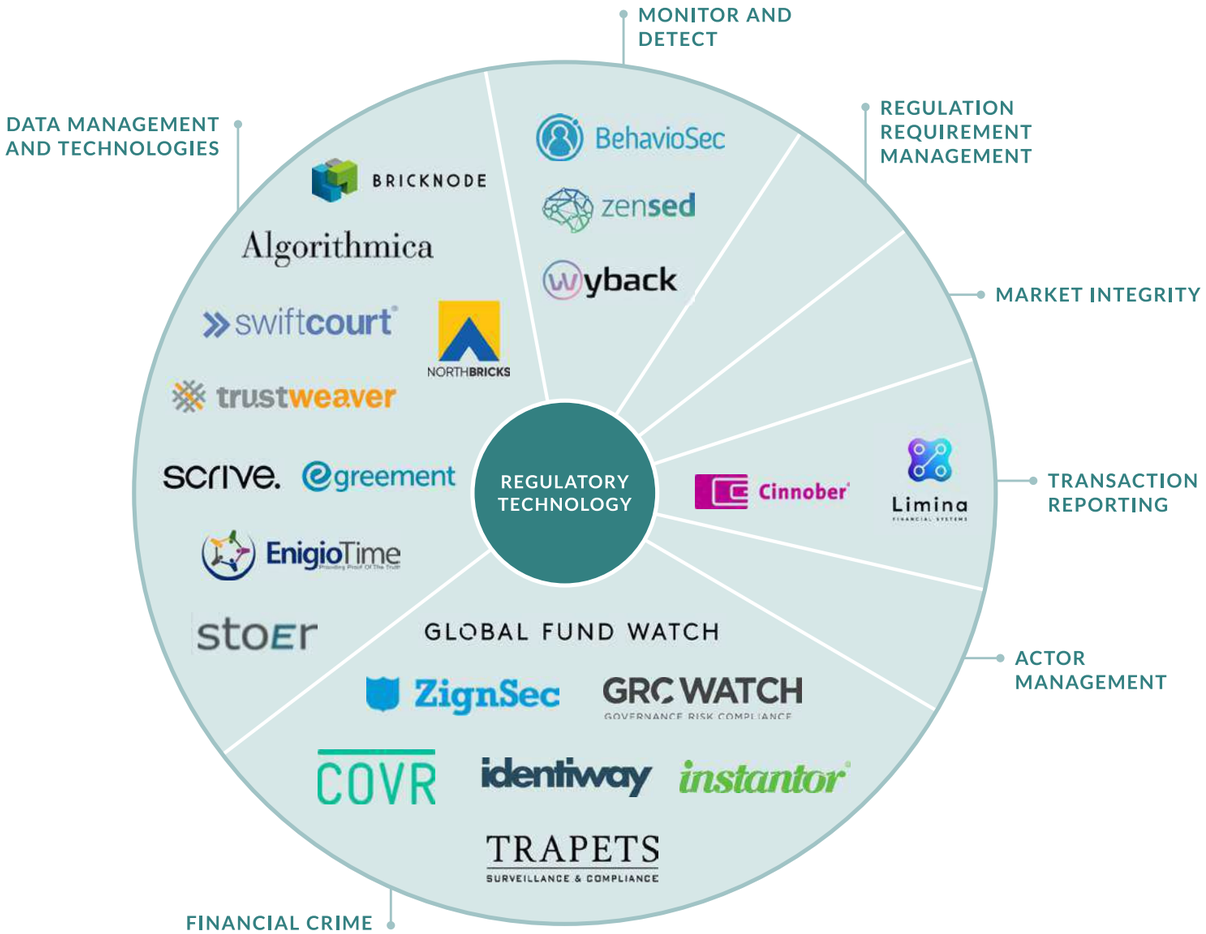


Figure 14. Swedish RegTech mapping

Figure 15. SSE & PA RegTech Taxonomy

Credits: Meeting / Henrik Trygg / imagebank.sweden.se

3.7 REGTECH: NEW REGULATIONS AND SOLUTIONS

3.7.1 Risk Data Aggregation

Soon after the collapse of Lehman Brothers, international heads of government attended the G20 summit in Washington D.C. to discuss the global financial regulatory framework.

At the summit the G20 issued a shared statement specifying how the "unsound risk management practices create[d] vulnerabilities in the [financial] system" (G20, 2008). The statement requested a new regulatory framework that would mitigate those vulnerabilities. Two years later the G20 tasked the Basel Committee in Banking Supervision (BCBS), a multinational organization established in 1974, with the objective of providing an international regulatory framework, to develop the much-needed regulations (G20, 2010).

In 2013, the Basel Committee developed the BCBS 239 regulation, "Principles for effective risk data aggregation and risk reporting". Risk data aggregation refers to the data needed to comply with regulations; it is characterized by being quantitative, structured and well-defined. The regulation is based on 12 different principles, of which the 3rd, 4th, 5th, and 6th are related to the risk data aggregation process. The key characteristic relevant to FIs are:

ACCURACY AND INTEGRITY
(3) "Data should be aggregated on a largely automated basis so as to minimize the probability of errors"

COMPLETENESS
(4) "A bank should be able to capture and aggregate all material risk data across the banking group"

TIMELINESS
(5) "A bank should be able to aggregate up-to-date risk data in a timely manner while meeting the principles relating to accuracy and integrity, completeness and adaptability"

ADAPTABILITY
(6) "A bank should be able to generate aggregate risk data to meet a broad range of on-demand, ad-hoc risk management reporting requests…"

Figure 16. BCSBS 239. Source: Basel Committee on Banking Supervision (2013)

The main objective of BCBS 239 is to aggregate risk data in a single platform. The 2008 financial crisis revealed that large FIs had their data stored separately in data silos. This resulted in inadequate stress tests, as FIs did not have a complete overview of their risk exposures. By aggregating risk data and automating the process, FIs will be able to produce appropriate stress scenarios and then modify their portfolio accordingly. The regulation was supposed to be enforced in January 2016. However, the process has been slower than expected. In the last two decades, FIs have suffered from a lack of corporate and enterprise architecture, and principles for information management. They have operated as a conglomerate of independent businesses without a strong core for integration and aggregation of information. This has been compounded through multiple M&As that have taken place without companies merging their IT systems. The risk-aggregating process has thus become expensive and time-consuming. Nonetheless, most firms consider the cost of complying with BCBS 239 as an investment that will eventually pay off.

According to Chartis, an independent research company, expenditure on IT systems and consultants has grown at a double digit pace of 10~12% in recent years. Risk, governance and compliance technology account for over 80% of the money spent on cost-based simplification (Chartis, 2016b). The market for risk data aggregation and reporting (RDAR) is worth USD10.46 billion, of which USD4.67 billion is spent on new solutions and the rest on maintenance (Chartis, 2016a). The share spent on new solutions shows a trend of FIS progressively updating their current IT systems.

The RDAR market is characterized by strong incumbent firms. This is understandable due to the large R&D required, initial costs, and security concerns. In the RiskTech 100 ranking, composed by Chartis, the top 10 companies are: FIS, Oracle, MSCI, SAS, Moody's Analytics, IBM, Murex, Misys, IHS Markit and NICE Actimize. Although RDAR is a key component, the ranking is based on risk management software products. Oracle features first in the section on Risk Data Aggregation & Reporting and no Swedish firm is featured in the ranking.

Oracle, globally the second largest software maker after Microsoft, has developed together with Lombard Risk, a UK software company, a unified platform called Oracle Financial Services Analytics Applications (OFSAA). The platform addresses the BCBS 239 compliance and reporting process by providing a common data infrastructure built on a single source of truth (SSOT) that supports data taxonomy and metadata (Oracle, 2014). The SSOT means that data is only stored once and that duplicates are only references to that specific data. It also automates the reconciliation and reporting process, enabling firms to do firm wide stress tests. The platform has been a success, winning the Operational Risk & Regulations award in 2015 and the Risk Data Aggregation & Reporting and the Risk & Finance Integration awards in 2015 (Oracle, 2015; Chartis, 2016b).
ActiveViam has developed a platform that focuses on speeding up the risk data aggregation process. The platform, called ActivePivot, uses in-memory processing and parallel computing to allow the user to aggregate data and obtain business analytics in real time. The platform also allows the user to perform multi-dimensional queries through its multi-dimensional Bitmap index. The Bitmap index offers significant efficiency gains compared to traditional indexes, which tend to be slow, due to its lightweight structure (ActiveViam, 2016).

Other key players in Europe are BearingPoint and Gresham. Bearing Point is a German technology consulting firm that has developed Abacus360 Banking. The platform serves to comply with the BCBS 239 regulations and uses a single data model. One of the main advantages is its calculation engine, which is based on in-memory processing, grid architecture and cloud services(BearingPoint, 2016).

Gresham, a UK software and services company, also uses an in-memory data greed in their platform, Clareti. Its platform's main advantage is the data integrity process, focusing on accuracy, completeness and timeliness, the third, fourth and fifth principles of BCBS 239 (Gresham, 2017). The platform won the Data Integrity & Control award in 2016 (Chartis, 2016b).
Nonetheless, FIs are still unclear on the ideal IT software type to tackle BCBS 239. As Mark Kalen, the Global Product & Marketing Strategy of IntraLinks, explains, BCBS 239 compliance "was a much larger and more complex process than people initially understood it to be" (Risk.net, 2016). Fidelity National Information Services (FIS), a US financial software provider, argues that banks need to rethink their whole risk accounting process and invest in a new type of risk architecture to comply with BCBS 239, what it calls the "USD8 billion game changer".

The current risk accounting approach is based on a hierarchical structure, with each level reporting to the next higher level. For instance, the Stockholm office reports to the Swedish office, the Swedish office reports to the EMEA office, and the EMEA office reports to global headquarters. This type of reporting is done manually once a month and conflicts with the third and fifth principles of the BCBS 239 regulations – that data should be automated and aggregated in a timely manner.

A further problem is the additive process. Banks with different branches add positions across the group and assess the overall risk. However, from a risk management perspective, the process is not accurate as it does not incorporate the diversification gains. For instance, the Value At Risk (VAR) of a group should not be calculated by adding the VAR of different branches, but by calculating the overall VAR. Hence, for example, VAR (Sweden + Brazil + China) ≠ VAR (Sweden) + VAR (Brazil) + VAR (China).

Additionally, BCBS 239 also requires banks to create forward-looking model forecasts and stress tests, which require large amounts of computing power. For instance, if a bank undertakes 100,000 trades, it will have to calculate 50 billion potential future exposure stress tests and 2,500 billion CVA sensitivities, which require 3.815 and 19 terabytes of data, respectively. This requires new types of storage technologies, such as in-memory processing.

Nevertheless, most of the solutions available are focused on the reconciliation process. FIs must understand that in order to actively aggregate data they must rethink their business platform data architecture. The SSOT must not be incorporated at the end of the process, which is the accounting and reporting department, but at every part of the value chain. If the front office in different departments use different pricing, risk and P&L tools, the reconciliation process will not achieve the goals intended in BCBS 239.
If those goals are not achieved, the regulatory authorities will acknowledge it during the evaluation process and propose new legislation to solve the identified deficiencies.

[2] The relationship between Regulatory Requirement Management and new technologies is not included in this report.

Therefore, to ease the compliance process, FIs must first understand the objectives laid out in the regulations and then design a system that meets those requirements. By understanding the intended functional requirements, a FI will outcompete its peers in the long term, as it will not have to redesign its data architecture system with every upcoming risk data aggregation regulation.

It is important to emphasize that a business data architecture with a SSOT does not only ease compliance costs but also provides the FI with an accurate view of its businesses. With the rise of Big Data and the shift of financial companies towards becoming pseudo-technology companies, the benefits of implementing a real business data architecture are far greater than the cost savings.

3.7.2 Financial Crime

The customer on-boarding process in the EU is guided by a set of principles designed to prevent money laundering and detect fraud. The current directive, the 4th EU Anti-Money Laundering Directive, was enacted in May 2015 and came into effect in June 2017 (Directive (EU) 2015/849).

Article No. 11 of the directive specifies that a FI must undertake a Customer Due Diligence (CDD) / Know-Your-Customer (KYC) procedure when: (i) establishing a new business relationship; (ii) carrying a transaction that exceeds EUR 15,000; (iii) doubting the veracity of customer identification data; and (iv) suspecting money laundering or terrorism funding activities.

The CDD procedure, defined in Article No.13, consists of:

- **Identifying a customer and verifying their identity;**
- **Identifying the beneficial owner, which is the person who has the right to use, and his or her identity (in certain occasions, the owner and the beneficial owner are different people/identities);**
- **Obtaining information regarding the purpose of the business relationship; and**
- **Conducting an ongoing monitoring of the business relationship.**

The FI must also perform a risk assessment and categorize the client as either a low-risk or a high-risk client. The risk assessment consists of developing a written report that explains how a user could use its business services to commit illegal activities. The categorization of the client is performed on risk-sensitive basis.

This risk based approach has raised compliance costs. Fortunately, the CDD process can rely on third parties. However, the ultimate responsibility falls with the FI that is establishing the business relationship or conducting the business transactions. This incentivizes firms to choose appropriate third parties and ensure that they follow the law.

Two Swedish companies, Trapets and ZignSec, aim to ease the CDD/KYC compliance process. The former has developed its own software to automatically produce risk assessments while the latter has created an API that collects strongly authenticated information from a trusted network, such as BankID and NemID, across different jurisdictions, thus easing the onboarding process.

Founded in 2000, Trapets specializes in automatic surveillance and compliance with KYC and AML regulations. Trapets has developed the InstantWatch

ASSESSING AND MANAGING RISK: GENERAL

Where the risk associated with a business relationship is low, and to the extent permitted by national legislation, firms may be able to apply simplified customer due diligence measures (SDD). Where the risk associated with a business relationship is increased, firms must apply enhanced customer due diligence measures (EDD).

Firms should gather sufficient information to be satisfied that they have identified all relevant risk factors, including, where necessary, by applying additional CDD measures, and assess those risk factors to obtain a holistic view of the risk associated with a particular business relationship or occasional transaction.

Figure 17. 4th AML. Source: JC/2017/37

Credits: Stefan Stefancik / unsplash.com

AML (IWAML) platform for monitoring money laundering and market abuse practices.

The platform analyses customers' transactions and account patterns in either real time or in batches, and performs an automatic risk assessment and categorizes the customer into different risk-groups.

Moreover, the platform provides a service through which a firm can easily gather evidence with respect to a consumer and build its own case study. This is helpful as in some cases the customer may have legitimate reasons to account for their suspicious transaction and the FI will not feel the need to report it.

Thus, it can add the reasons together with the data to argue why they have not considered the account as a high-risk customer. IWAML has also incorporated the United Nations Office on Drugs and Crime (UNODC) software to electronically report high risk activities to the competent authorities (Trapets, 2017).

ZignSec, a Swedish company with headquarters in Solna, Stockholm, provides a business-to-business (B2B) verification platform to ease the KYC compliance process. It uses a trust network from connected clients, such as banks, to automate and ease the verification process under a single API. This unification serves to create an Electronic ID across different jurisdictions. At the moment, the Electronic ID is offered in the following countries, in addition to Sweden: Brazil, Bulgaria, Croatia, the Czech Republic, Denmark, Estonia, Finland, Georgia, Latvia, Lithuania, Mexico, the Netherlands, Norway, Poland, Romania, Spain, and the UK (ZignSec, 2017).
These two companies thus allow FI or FinTechs to either efficiently perform a risk assessment or use previous strongly authenticated methods used out by banks to comply with the 4th AML directive.

3.7.3 Transaction Reporting

In early 2018, the Markets in Financial Instruments Directive II (MiFID II) and Markets in Financial Instruments Directive (MiFiR) will come into force (ESMA, 2017). The two directives will impact on trading venues, investment services, and the interaction between a consumer and their bank(s).

MiFID II will repeal its predecessor; MiFID I. MiFID I was a key milestone in the push to regulate the financial services industry in the EU. It created the European Passport, which FIs can use to operate outside their home country, and enacted guidelines to increase the transparency in trading venues. However, the 2008 financial crisis revealed its inefficiencies and therefore need to revise the directive. In 2014, the European Parliament accepted MiFID II and MiFiR, and offered a 3-year transition period for FIs to implement the new regulatory framework.

Pre- and Post-Trade Transparency & Best Execution

As stated previously, most EU regulations aim to use transparency as a method to create a competitive market across Europe and provide consumer protection. Under that premise, MiFiD II and MiFiR have updated the framework under which most trading takes place. This updated framework is composed of:

[3] Each of the platforms provide certain exemptions for specific trades which will be discussed below.

TRADING VENUES

ORGANIZED TRADING FACILITIES (OTFS)

are new multilateral trading venues defined in MiFID II for non-equities trades and especially for derivatives, which are obliged to use this platform. The venues are characterized by allowing voice trading and trading on a discretionary basis, without needing the clients' consent, if the trade is not against the clients' interest.

REGULATED MARKETS (RMS)

are multilateral trading systems operated by market operators in which third parties buy and sell shares on a non-discretionary basis, which require the market operator to contact the client and obtain approval before executing the trade.

A MULTI-LATERAL TRADING FACILITY (MTF)

is similar to RMs with the exception that it can be operated by an investment firm.

NON-TRADING VENUES

SYSTEMATIC INTERNALISERS (SIS)

are *investment firm[s] which, on an organised, frequent systematic and substantial basis, deals on own accounts when executing clients orders outside regulated a regulated market, an MTF or an OTF without operating a multilateral system* (Directive 2014/65/EU).

The MiFID II and MiFiR regulations will increase the number of pre- and post-trade transparency requirements for the platforms, and will have a different effect on equities and non-equities trading practices.

EQUITIES

- **Shares**
- **Depository receipts**
- **Exchange Trade Funds (ETFs)**
- **Certificates**
- **Other similar financial instruments**

NON-EQUITIES

- **Bonds**
- **Structured finance products**
- **Emission allowances**
- **Derivatives**

Table 4. Differences between Equities and Non-Equities. Source: Regulation (EU) 600/2014

For instance, in MiFID I, SIs only covered equities, while in MiFID II they cover both equities and non-equities. Furthermore, MiFID II introduced non-equities trading venues (OTFs) with the aim of covering many of the non-equity trades that were previously done opaquely, e.g. derivatives trades. **Thus, in the case of equities, the new transparency requirements will increase compliance costs but will not dramatically change their previous trading system, whereas, in the case of non-equities, firms will have to redesign their trading lifecycle to comply with the new transparency requirements.**

These transparency requirements can be divided into two subsections; pre- and post-trade transparency requirements.

In the case of pre-trade transparency requirements, MiFiR Articles No. 3 and No. 5 require RMs, MTFs and OTFs to make public current bids and offer prices in a continuous basis during trading hours, whereas Articles No. 13 and No. 18 require SIs to publish public firm quotes if there is a liquid market and the financial is not either Large In Scale (LIS) or above Size Specific to the Financial Instrument (SSTI).

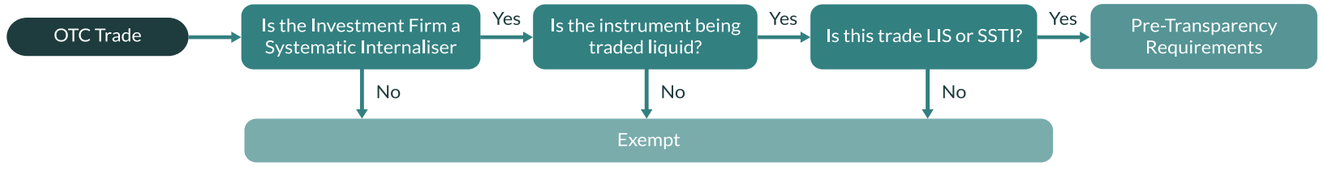


Figure 18. Transparency Requirements for SI

In the case of post-trade transparency requirements, MiFiR Articles No. 20 and No. 21 require RMs, MTFs, OTFs and SIs to report publicly the price and volume of concluded transactions through an Approved Publication Arrangement (APA). For equities products, firms must publish the price and volume within one minute of execution and for non-equity products, within 15 minutes (and within 5 minutes by 2020). APAs need to be approved by local competent authorities and are in charge of efficiently disseminating the information and publishing it on a reasonable commercial basis, defined as within 15 minutes. Furthermore, a firm is responsible for ensuring the timelessness, completeness and accuracy of its reported trades.

Furthermore, Article 14 of MiFID II requires investment firms to record telephone and electronic communications related to the reception, transmission, and execution of a client's orders. These records must be kept for a period of five years and, if requested by the regulators, for a period of seven years.

Finally, Article 27 of MiFID II has updated the requirements for Best Execution. The updated article substitutes "all reasonable steps" for "all sufficient steps", which puts a higher burden on an investment firm to prove Best Execution methods. Investment firms that execute client orders must also publish on an annual basis the top five execution venues in terms of trading volume, and monitor and assess the effectiveness of its orders. If the assessment reveals inefficiencies, the investment firm must correct them. Best Execution practices are also extended to non-equities, which creates a problem, as non-equities are not as liquid as equities and thus it becomes harder to prove that the trade has been executed on terms most favourable to the client. Nonetheless, this **regulation aims to link fragmented markets and increase the transparency for non-equities, which could ease the process in the future.**

From all these steps, it is possible to infer that MiFiD II and MiFiR have substantially increased the amount of data that is needed to be reported to the competent authorities. These new requirements have affected equities and non-equities differently, and investment varies according to the type of business conducted. It is also important to highlight that this report does not detail many of the exemptions and deferrals that are included in MiFiD II and MiFiR, which make the process even more complicated. Consequently, many RegTech firms have emerged to specifically deal with the MiFiD II directive. Four RegTechs have been identified that specialized in easing the pre- and post-trade reporting solutions and/or Best Execution methods.

TRADEcho provides pre- and post-trade reporting solutions to investment firms. The company is the result of a partnership between an incumbent, the London Stock Exchange (LSE), and a RegTech firm, Boat Services,

Table 5. shows the data that needs to be published to comply with post-trade data transparency requirements.

EQUITIES & NON-EQUITIES

- **Trading date and time**
- **Instrument Identification Code**
- **Price**
- **Price Currency**
- **Venue of Execution**
- **Publication Date and Time**
- **Quantity**

NON-EQUITIES

- **Instrument Identification Code Type**
- **Price Notation**
- **Notation of the quantity in measurement units***
- **Quantity in measurement units***
- **Notional amount**
- **Notional Currency**
- **Type****
- **Transaction Identification Code**
- **Transaction to be cleared*****

* *Only commodity derivatives, emission allowance derivatives and emission allowances*

** *Only emission allowances and emission allowance derivatives*

*** *Only derivatives*

Table 5. Post-trade data transparency requirements. Adapted from Commission Delegated Regulation 2017/587.

ARTICLE 27

Obligation to execute orders on terms most favourable to the client

1. Member States shall require that investment firms take all sufficient steps to obtain, when executing orders, the best possible result for their clients taking into account price, costs, speed, likelihood of execution and settlement, size, nature or any other consideration relevant to the execution of the order. Nevertheless, where there is a specific instruction from the client the investment firm shall execute the order following the specific instruction.

Figure 19. MiFID II. Source: Directive 2014/65/EU

and was formed in 2015. Boat Services is a subsidiary of the Swedish Technology firm Cinnober. TRADEcho first helps investment firms to identify whether they are SIs or not and then provides a platform to deal with the pre- and post-trade reporting transparency requirements. For pre-trade reporting transparency requirements, the platform supports customers in publishing quotes via the LSE or other websites. For post-trade reporting transparency requirements, the firm has introduced Smart Report Routers (SRR). The SSR determines who should publish the trade (the buy or sell-side) and the specific requirements of this, routes the trade directly to an APA of choice, and includes the possibility of providing assisted reporting. Assisted reporting allows buy-side firms to monitor the reporting process. TRADEcho also delivered a cost-efficient 'APA lite' solution, which provides the minimum services to comply with the pre- and post-trade transparency requirements (TRADEcho, 2017).

MarkLogic, a US firm founded in 2001 with a strong presence in Europe and an office in Stockholm (MarkLogic, 2017), has created a platform to deal with MiFID II Article 14, which deals with recording and storing data. The platform has a Bitemporal view of data that tracks both when the event occurred and when it was recorded. The Bitemporal feature is irreversible – data cannot be tampered with – and it is easy to query, facilitating the job of the auditor and regulator (MarkLogic, 2016a). Furthermore, the platform has a tiered storage feature that allows the storing of data in different tiers, thus optimizing the data lifecycle. This is of importance as data storage costs vary widely according to each tier's specific needs. For instance, SSD storage, which is very expensive, allows users to access data on a continuous basis, while HDFS or Amazon S3, which are very cheap, allows users to archive data for long periods of time. Thus, by using a tiered system, the user can minimize storage expenses (MarkLogic, 2016b).

SteelEye is a UK RegTech firm founded in January 2017 with the explicit aim of offering MiFID II solutions. The company offers a platform for record keeping, transaction recording, trade reconstruction, and best execution solutions. SteelEye Locker allows users to store data in a regulatory compliant WORM (Write Once, Read Many) form. The records are stored in the geographical location of choice and are easily accessible through SteelEye's dynamic web-interface. The dynamic interface eases the trade reconstruction process in which an investment firm must supply regulators past communications, orders and trades (SteelEye, 2017b). The platform also facilitates best execution practices, allowing the investment firm to monitor and survey all its orders and executions, and extract regulatory compliant reports (SteelEye, 2017a).

RegTek Solutions is the regulatory compliance software subsidiary of Risk Focus, a US firm headquartered in New York. In August 2017, Deutsche Borse Group, which operates the Frankfurt Stock Exchange, and Illuminate Financial Management LLP, a UK firm based in London, partnered with RegTek Solutions to design and produce MiFID II solutions, investing USD5 million. The Deutsche Borse Regulatory Reporting Hub will incorporate key components from RegTek Solutions, such as RegTek Validate. Trade, to its OTC trade reporting solutions and specially, derivative trades (RegTek Solutions, 2017; Deutsche Boerse, 2017). RegTek Validate.Trade has built an automatic system based on new regulations, repositories (e.g. APA), and control and compliance teams. Firms test their reporting data in this automatic system to ensure that its quality, integrity and content are acceptable before sending it to the regulator (RegTek Solutions, 2017).

As a final point, the new requirements laid out in MiFiD II and MiFiR are raising compliance costs significantly. We have briefly described the sections within the directives that will contribute most to these compliance costs and set out the solutions available in the market. It is recommended FIs take a pro-active stance and cooperate with RegTechs as a long-term strategy in order to stay ahead of the curve.

3.7.4 Market Integrity

In financial markets trust is extremely important and market integrity needs to be protected. With that goal in mind, in 2014 the European Union repealed the Market Abuse Directive and introduced the Market Abuse Regulation (MAR) (ESMA, 2015). The new directive has increased the scope of instruments subject to the market abuse regime and it applies now to financial instruments admitted to trading in MTFs and OTFs. The market operators of regulated markets, MTFs and OTFs are required to notify the competent authorities of any request for admission to trading in its venues and to prevent and detect market abuse. Article 16 of MAR describes the guidelines to prevent and detect market abuse.

ARTICLE 16

Prevention and Detention of Market Abuse

1. Market operators and investment firms that operate a trading venue shall establish and maintain effective arrangements, systems and procedures aimed at preventing and detecting insider dealing, market manipulation and attempted insider dealing and market manipulation…

2. Any person professionally arranging or executing transactions shall establish and maintain effective arrangements, systems and procedures to detect and report suspicious orders and transactions. Where such a person has a reasonable suspicion that an order or transaction in any financial instrument, whether placed or executed on or outside a trading venue, could constitute insider dealing, market manipulation or attempted insider dealing or market manipulation, the person shall notify the competent authority…

Figure 20. MAR, Article 16. Source: Regulation 596/2014

The guidelines are followed by a defined set of penalties in case of infringement. For instance, if a legal person (e.g. corporation) infringes Article 16, it will incur a maximum sanction of at least 2.5 million euros or 2% of its total annual turnover.

Investment firms and market operator must thus take an active stance to supervise trading venues and detect suspicious activities.

NASDAQ, which controls the Stockholm Stock Exchange, offers the SMART trade surveillance system to detect market abuses. The SMART Trade surveillance system is a Software as a Service (SaaS) solution that is used by over 1000 compliance professionals and operates in over 85 trading venues. The software covers a wide array of market abuse behaviours such as insider trading, market manipulation, and order handling rules. It links trading activity across venues detecting trading abuses that are performed over different channels and provides business intelligence tools by leveraging heat maps, presenting information to management and analysing alert results .

Furthermore, MiFID II, which was mentioned earlier, also included a series of articles to enhance market integrity. These articles focus on unbundling research costs and increasing transparency.

Unbundling Research Fees - Equity Markets

MiFID II redesigned the securities trading value chain with a focus on consumer protection. Article 23 forbids independent investment advisors and portfolio management firms from receiving inducements, which are commissions paid by the financial product manufacturer.

This eliminates the conflict of interest that arises when an independent advisor receives commission fees from both the client and the supplier. Article 13 of the delegated act, which is a supplementary legal document, states that research fees must be paid by the client and establish controls for ensuring that research fees provide value to the client.

The new controls imposed by MiFID II and its delegated act will redefine equity research practices. **Until MiFID II, investment firms received free research from investment banks in exchange, although implicitly, for allocating some of their trades through them.** This created a conflict of interest as investment firms would

ARTICLE 23

1. Member States shall require investment firms to take all appropriate steps to identify and to prevent or manage conflicts of interest between themselves (…) and their clients (…) including those caused by the receipt of inducements from third parties (…).

7. Where an investment firm informs the client that investment advice is provided on an independent basis, that investment firm shall: (…) (b) not accept and retain fees, commissions or any monetary or non-monetary benefits paid or provided by any third party or a person acting on behalf of a third party in relation to the provision of the service to clients.

8. When providing portfolio management the investment firm shall not accept and retain fees, commissions or any monetary or non-monetary benefits paid or provided by any third party or a person acting on behalf of a third party in relation to the provision of the service to clients.

Figure 21. MiFID II. Source: Directive 2014/65/EU

ARTICLE 13

Inducements in relation to research

1. (…) the provision of research by third parties (…) shall not be regarded as inducement if it is received in return of any of the following: (a) direct payments by the investment firm out of its own resources (b) payments from a separate research payment account controlled by the investment firm (…).

5. The investment firm shall agree with clients, in the firm's investment management agreement or general terms of business, the research charge as budgeted by the firm and the frequency with which the specific research charge will be deducted from the resources of the client over the year.

6. The allocation of the research budget to purchase third party research shall be subject to appropriate controls (…). Those controls include a clear audit trail of payments made to research providers and how the amounts paid were determined with reference to the quality criteria.

8. It shall also address the extent to which research purchased through the research payment account may benefit clients' portfolios.

Figure 22. Research Inducements. Source: Commission Delegated Directive 2017/593

not be incentivized to choose the best trading partners and the research fees, which would be added together with the execution fees, would not be noticed by the client. MiFID II prevents these types of practices, but increases compliance costs and raises uncertainty. Firms must be able to explain from a quantitative and/or qualitative standpoint their research spending habits.

Consequently, **a new wave of startup activity has emerged to ease the decision-making process and provide market information that can be used to support their research expenses.**

Founded in 2015, FeedStock, a London-based UK company, aims to deal with the new compliance issues arising from MiFID II. The RegTech company has created a platform that runs in the background of the buy-side investment firm. The platform captures all the interaction with research providers and uses machine learning to filter, valuate, classify, and budget research while ensuring that every interaction is MiFID II compliant (FeedStock, 2017). This allows the investment firm to focus on obtaining the best research while the platform takes care of the rest, to an extent.

Similarly, Alpha exchange, another London-based UK company, was founded in 2016 as a research compliance solution. It offers a platform for both research providers and buy-side investment firms to interact with each other. On the one side, the platform offers a research budgeting software that keeps track of research payments and consumed research. On the other side, research providers gain from being exposed to buy-side firms and the platform allows them to monetise their intellectual property. Alpha Exchange was the winner of the FinTech Breakthrough award for best financial research and data company (Alpha Exchange, 2017).

Finally, ipushpull is another UK company founded in 2013 that offers a web-service solution for monitoring, tracking and budgeting research consumption. The platform has the distinctive feature of allowing users to store research documents within the platform and share them by giving authorization rights instead of passing documents. This ensures that the documents are not passed to unwanted people and allows users to monitor their use. The firm has won two UK Innovate grants to continue working in advanced access control and data security (ipushpull, 2017).

3.7.5 Monitor and Detect

Financial institutions need to monitor and detect fraud in all channels. In the following paragraphs we describe the requirements laid out in the new PSD2 to prevent payments fraud.

The first Payment Service Directive (PSD1) was enacted in 2007 and provided a regulatory framework for payment services, such as credit transfers, direct debits and card payments (EUR-LEX, 2007).

The goal was to incrementally increase competition and consumer protections. It lowered the barrier for new entrants to enter the market by introducing non-bank payment service providers and increased consumer protection by requiring payment service providers to disclose all fees to the consumer.

In 2015, the second directive, PSD2, was proposed by the European Parliament and Council. The regulation introduced Payment Initiator Service Providers. The PISP acts as a bridge between the buyer and the seller bypassing the credit/debit card and merchant acquirer, becoming a true alternative to credit card payments as they offer an easily accessible payment service (European Commission, n.d.)

PSD2 is expected to be enforced in 2018 and will allow new service providers to enter a competitive market but it will also require them to follow strict security mechanisms to ensure consumer protection.

The regulation requires PISPs to apply Strong Customer Authentication (SCA), which is *the use of two or more elements categorised as knowledge (something only the user knows [e.g. password]), possession (something only the user possesses [e.g. card-reader]), and inherence (something the user is [e.g. fingerprint]).*

However, in February 2017 the European Banking Association (EBA) which was developing the technical standards of the PSD2 exempted service providers from SCA if: (i) the user initiating the transaction has a low risk profile, (ii) the value of the transaction is under 500 euros, and (iii) the PSP has an overall fraud rate under a pre-defined threshold (EBA, 2017). The following list illustrates the maximum fraud rates a PSP can have in order to adhere to the exemption.

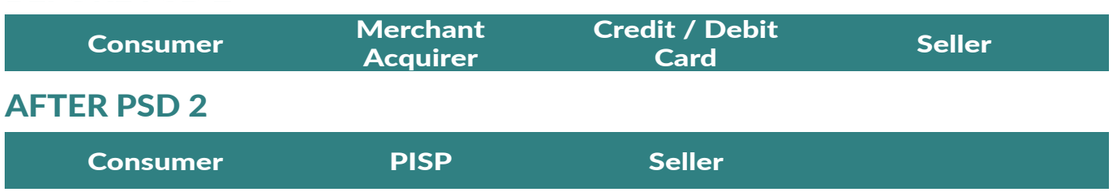


Figure 23. Payment Initiator Service Providers

REFERENCE FRAUD RATE (%) FOR:		
ETV	Remote card-based payments	Credit Transfers
EUR 500	0.01	0.005
EUR 250	0.06	0.01
EUR 100	0.13	0.015

Table 6. Reference Fraud Rate. Source: EBA (2017)

The regulation thus offers greater flexibility to those companies that manage to maintain low fraud rates. **In the past, most security measures used knowledge and possession authentication measures to protect customers – for instance, consumers had a password and a card-reader to process their transaction.** However, data breaches and stolen identity have been common, resulting in around USD112 billion being stolen in global first-party credit card fraud and 845 million consumer records being compromised (LexisNexis, 2016).

These numbers illustrate the current state of fraud prevention and the need to update security measures. With the advance of Big Data, a new trend towards behavioural biometrics has emerged to combat fraud. Behavioural biometrics measures use behavioural data to define the person using the service. For instance, a software stores your unique behaviour (writing style, mouse movement, past transactions) and identifies you as a user. If a fraudster steals your identity, the software will notice a change in usage patterns and either block the account directly, or, in case of doubt, require further identification measures.

Many banks have already implemented this type of software in their own applications, reducing fraud levels and fraud alerts (QUARTZ, 2016). Established security-related companies have also reported an increasing demand for their services in recent years, showing an overall trend towards BehavioMetrics (Behavioural Metrics) security measures. PSD2 and the exemptions granted by the EBA are expected to further increase the demand for this type of service in the coming years. Two leading companies in this field are BehavioSec and PayGilant. BehavioSec is a Swedish startup founded in 2006 that uses behavioural patterns, such as pressure and pressing times, to identify the user. PayGilant is an Israeli startup that uses transaction patterns to map user behaviour.

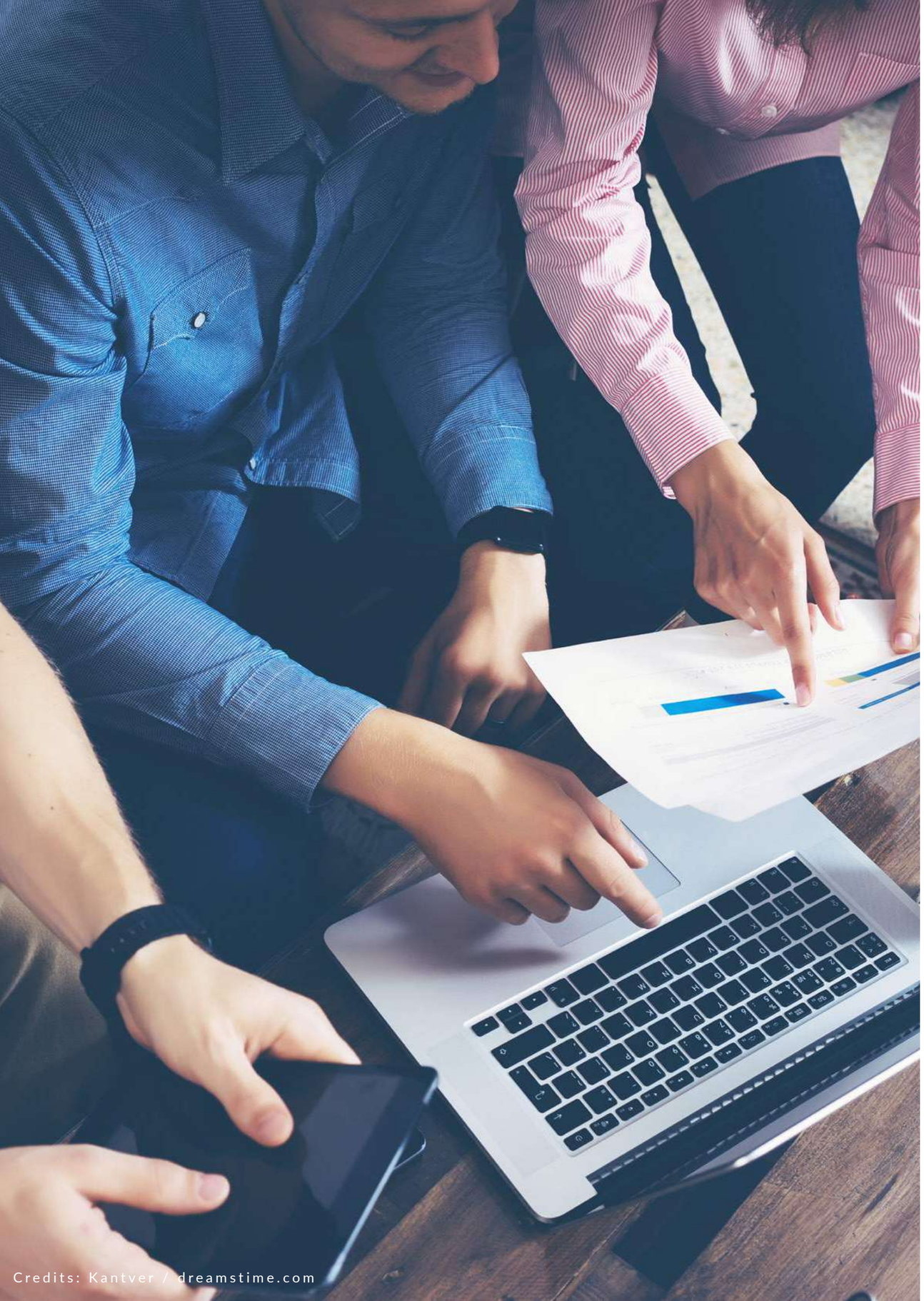
BehavioSec is one of the pioneers in using BehavioMetrics as an information security solution. It started as a spinout from a Master's thesis written at Luleå University. In their paper, Jonas Johansson and Peder Nordström built an algorithm that was able to verify users by examining their key strokes. As of 2017, they have worked with Nordic banks for over six years, expanded to the Benelux region, and completed three successful projects with the US Defence Advance Research Project Agency (DARPA). Among their investors, Northzone and Octopus Ventures stand out, having invested a total of EUR5 million in December 2014.

Their business model focuses on B2B2C. BehavioSec sells its software to banks, and banks implement the software on their webpages and mobile applications. Currently, BehavioSec has over 35 million end-users spread over 30 countries.

This software is a passive method of authentication. It first records the user behaviour, such as total pressure, time between pressing and releasing a key, and time between releasing a key and pressing the next one, and then transforms this into decision intelligence for risk assessment. If the user's risk level is below a certain threshold, the application rejects the user and vice-versa. The software manages to identify user behaviour after three to seven logins and then it transitions towards a continuous stage. In the continuous stage, each new individual input matters less and it serves to adapt the software to small changes over time. To offer a satisfying user experience, the threshold is adjusted to balance false acceptances and false rejects. A false acceptance occurs when the wrong user is accepted, and a false reject appears when the right user is rejected. The common standard to evaluate this type of software is to measure the equal error rate (EER), which is the point at which the false rejection rate equals the false acceptance rate. BehavioSec evaluated their software using 4,000,000 payment transactions and obtained a low EER of 1.4%.

The software has already been proven to be effective by decreasing the number of false flags by half, from 9000 to under 4500. A false flag occurs when a bank wrongly perceives a transaction as fraud and must manually verify the user making the transaction.

The software is implemented in the native app and the data analytics process occurs on the server,



Credits: Kantver / dreamstime.com

which can be on the premises or in the cloud. At the moment, BehavioSec is initiating talks with mobile manufacturers to implement its software in their operating systems. In the future, its software could run in every app, continuously verifying the user operating the smartphone, from actions ranging from texting to making payments.

As an alternative, Ziv Cohen, PayGilant's CEO, considers identity theft to be the biggest threat to payment transactions. This type of fraud can be used to bypass other strong authentication measures through the on-boarding process. For instance, a fraudster can use a stolen identity to register as the rightful owner and the payment provider would not be able to recognize who the person is registering in the application. Hence, the authentication measures would be generated by the fraudster and would not serve the intended purpose of preventing fraud.

To prevent this type of scheme, PayGilant has designed a software that maps the user's previous transactions and generates a behavioural map. Consequently, if the fraudster on-boards in a new mobile application and makes payment transactions that do not correspond with previous transaction data, the software will directly block the card or require a stronger authentication measure. The behavioural map is updated every three days and thus can adjust to small changes over time. Furthermore, PayGilant shares with other payment service providers (PSPs) the behaviour of fraudulent merchants. This allows other PSPs to compare the data with its own users and detect accounts that behave similarly, which can be especially useful for preventing massive fraud schemes.

PayGilant's software is integrated within the mobile payment app and undertakes the risk-assessment directly from the device. Since it is a passive authentication method, it does not require any type of effort from the customer except in high risk scenarios.

Ziv Cohen argues that, *the market has learned from what happened in the internet channel because initially banks and other providers did not cover the malware threat at the right time. Consequently, fraudsters were able to circumvent solutions and launch fraud attacks causing severe damages to banks and financial providers. The need for such security solutions is growing. This is the feedback that we are getting from the market, from our customers, from banks, from mobile payment providers and the need to reach this gap is really immediate.*

He continues that in Europe, PSD2 is, *trying to balance between usability and security. For example, up to 30 euros you never need to authenticate. That's where we fit into the picture as they need to reduce the risk and fraud losses to improve user experience and increase adoption rate.*

In conclusion, **the new payment directive is going to liberalize payment and account service providers. The goal is to digitalize the payment industry and introduce competition across Europe.** To promote these types of service providers while ensuring consumer protection, PSD2 rewards companies that keep their fraud rate under a certain threshold by exempting them from complying with strong authentication measures. Since the mobile payments market in Europe is still young, companies must compete to provide a satisfactory user experience, both in terms of usability and security. Thus, passive methods of authentication, such as that used by BehavioSec and PayGilant software, which manages to lower fraud rates without bothering the customer, are in high demand.

3.7.6 Data Management and Technologies

Data Management is key for effective and efficient regulatory management. It covers solutions for Master Data Management, Definitions, Standards and Data technologies. The following paragraphs discuss how regulations affected the E-invoicing industry and the solutions available in the market.

E-invoicing constitutes one of the key strategies set out by the European Commission to create a highly competitive European Social Market Economy (European Commission, 2010). A complete move from paper invoices to electronic invoices (e-invoicing) is estimated to generate savings of EUR240 billion over a six-year period. Consequently, in 2010, the EU adopted Directive 2010/45, which amends the previous directive 2006/112 and introduces a new invoicing framework. According to the European Commission, one of the three main objectives was to increase the use of e-invoicing (European Commission, 2017). In order to achieve such an objective, the European Council made the following significant changes:

- Paper and electronic invoices should be treated equally
- The authenticity and integrity of electronic invoices can also be ensured by using certain existing technologies, such as Electronic Data Interchange (EDI) and advanced electronic signatures. However, since other technologies exist, taxable persons should not be required to use any particular electronic-invoicing technology.

Figure 24. E-invoicing Directive. Source: Council Directive 2010/45/EU

The changes promoted the use of electronic invoices and opened the means of authentication and integrity, which were previously restricted to either EDI or advanced electronic signatures in the former directive.

TrustWeaver is a RegTech company specializing in e-invoicing compliance. It started as a group of legal and technical professionals who were specialized in the IT industry that combined their skills to help companies meet legal requirements. In 2007, TrustWeaver launched its first fully hosted compliance service and in 2017 it was the second company in the world to be awarded the status of Qualified Trust Service Provider under the EU eIDAS regulation. As of 2017, TrustWeaver has a platform that is able to solve e-invoicing compliance related issues in over 50 countries.

The platform is built through cooperation between the legal and product development teams. First, the legal team analyses the regulatory framework in each country and passes the information to the product development team. The product development team then configures the server to select the relevant compliance requirements, such as certificates, applicable signatures, and suitable archiving methods. For instance, if a Swedish company wants to send a legally compliant invoice to a Mexican company, it will just need to connect with the TrustWeaver platform, send the invoice, and input the country code MX. The TrustWeaver platform will then automatically find the relevant compliance requirements, digitally sign the invoice using a Mexican certificate, and return the invoice to the desired party.

In e-invoicing, VAT is often the driver of requirements. Since VAT is not paid in the last part of the transaction and the consumer does not report it, the requirements mostly affect B2B transactions. Hence, TrustWeaver focuses on B2B businesses, such as e-invoicing service providers, hubs, B2B platforms, and e-commerce platforms.

The latest directive, 2010/45, on B2B e-invoicing, liberalized the methods used to ensure the authenticity and integrity of e-invoices. Instead of strict technology-specific requirements, it allows vague functional ones. According to Anna Norden, this affected northern and southern Europe in different ways. In northern Europe, the directive was aligned with previous local IT laws and thus, it was welcome. In southern Europe, it was unprecedented and created legal uncertainty. Consequently, southern European countries started to develop their own local technical specifications under the premise that this was needed to combat fraud. For example, Portugal introduced software certification as an additional method to combat fraud. The result is, ironically, non-harmonized EU e-invoices standards.

Anna Norden, the general counsel from TrustWeaver, reflects that there is a trade-off between having technology specific and functional requirements. Technology specific requirements can steer the markets in unwanted ways, hindering innovation and competition, while functional requirements create legal uncertainty. Hence, it is hard to design laws that satisfy every party involved. Nonetheless, the European Commission should analyse the current situation, understand that the directive has not harmonized the situation in Europe, and decide what the next steps should be to manage the situation.

Finally, there is the global trend from post-audit systems towards clearance systems. Clearance systems require businesses to notify authorities and obtain a stamp of approval before issuing invoices, as a method to prevent tampering of evidence, while post-audit systems rely on auditors requesting past invoices from a specified time interval. Clearance systems were introduced recently as a method to combat corruption in countries with large VAT gaps and proved to be successful. Consequently, the system has been expanding and is expected to eventually be implemented in the EU.

3.7.7 Actor Management

One of the most important aspects of regulatory management is how to handle information about customers, counterparties and other actors. FI must comply not only with existing regulations during the on-boarding cycle but also with changes in actor information management requirements such as KYC with periodical updates as well as changes in regulations. Thus, an actor management solution must aim to ease the process across the whole lifecycle of a commercial relationship to all type of actors. With new technologies, management of this process is vital to enable digital service offerings and open banking platforms and at the same time be regulatory compliant.

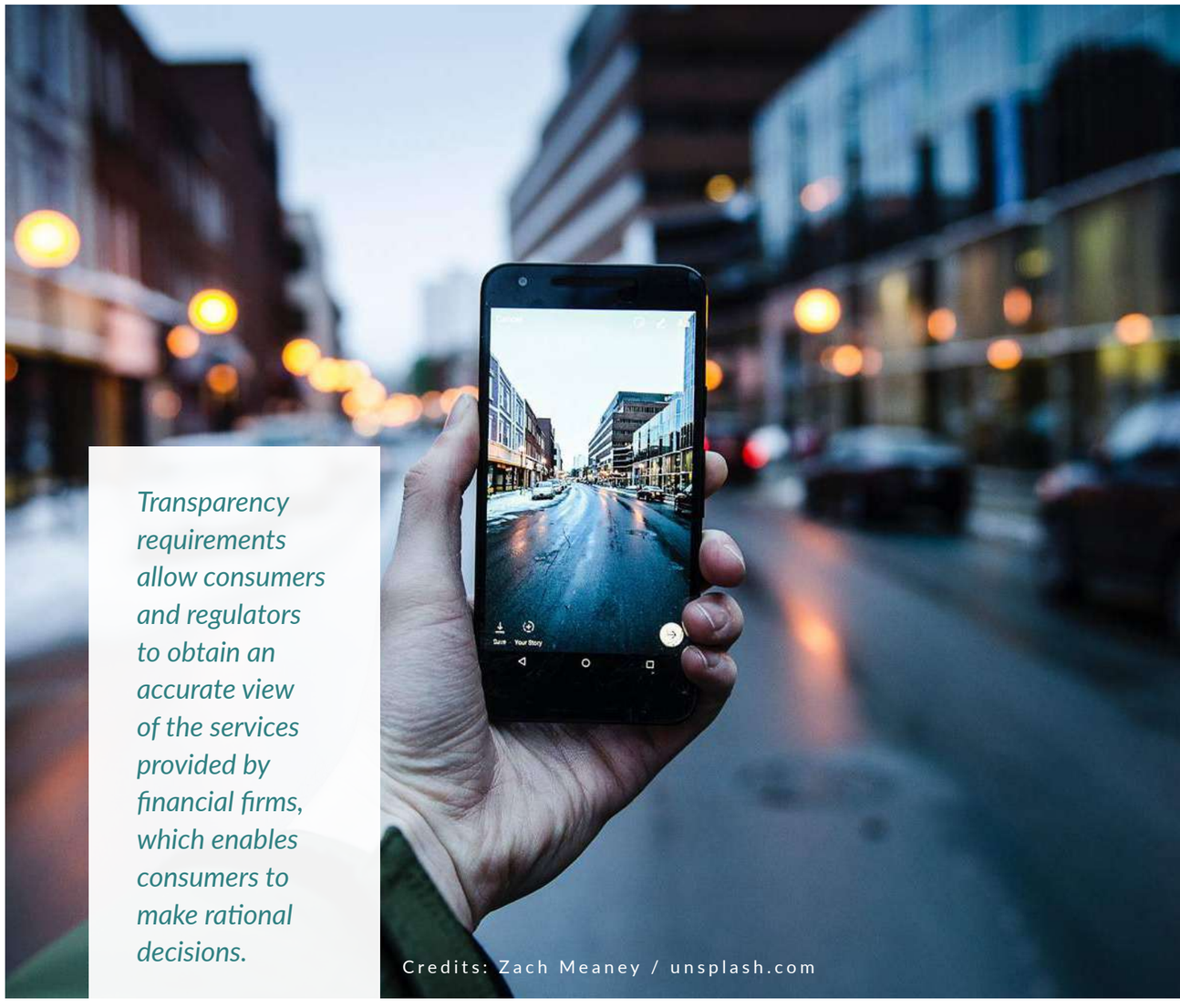
The actor management system allows banks to obtain a full overview of its eco-systems relationships in a digital format, update its infrastructure seamlessly and reduce its infrastructure costs substantially. The service does not only apply to the retail customers but can also cover other processes in the organization such as Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM). We have identified two companies that fit the actor lifestyle management profile, Fenergo and Aptean.

Fenergo, a B2B RegTech Irish firm established in 2009, is one of the first firms to provide actor management solutions in the cloud. The Fenergo LifeCycle Management platform enables its customers to administer data management, enterprise compliance and client and onboarding processes.

The entity data management platform has a central depository of all client and counterparties data. The data is only entered once and can be reused at any time. The enterprise compliance management platform ensures that data is compliant with the existing regulations. It does not only cover clients but also financial products complying with regulations such as EMIR and MiFID II. The client and product on-boarding platform eases the on-boarding process by automatically that all data and documentation is identified. The overall platform also follows a LifeCycle approach by conducting periodical reviews of the data (Fenergo, 2014).

Aptean, a US based company, also provides actor management solutions through their Pivotal CRM platform. The Pivotal CRM platform is highly flexible as it is based on a three-tier architecture. The three-tier architecture separates its foundation (database) from middle tier (application server) and presentation tier (user access tier). This allows for greater flexibility and performance enhancement. The platform provides an end-to-end client relationship management (CRM) service built on the MICROSOFT .NET framework to commercial banking and capital markets (Aptean, 2012c). For commercial banking, the platform creates a holistic client view which includes all the clients' opportunities, transactions, contacts, interests and business plans (Aptean, 2012a). For capital markets, the platform provides reporting tools that allow ad-hoc reports, offers a relationship management tool integrated with Microsoft Outlook and records trade activities and interaction between the company and the client (Aptean, 2012b).

In conclusion, the holistic view of the client is needed to describe the relationship between the client and the firm. This holistic view allows the FI to define the mandate of the end-user and put in the checks needed to ensure compliance.



Transparency requirements allow consumers and regulators to obtain an accurate view of the services provided by financial firms, which enables consumers to make rational decisions.

Credits: Zach Meaney / unsplash.com

3.8 BLOCKCHAIN

As we have seen throughout the report, regulatory authorities have emphasized transparency requirements. These transparency requirements allow consumers and regulators to obtain an accurate view of the services provided by financial firms, which enables consumers to make rational decisions. In the long term, the rational decisions encourage a competitive market as customers choose the best services at the lowest cost. However, the new transparency requirements can also hinder productivity as the reporting requirements increase compliance costs and slow down the service provided.

Blockchain is the application that shows how regulatory requirements can also be a future path towards innovation. Although correlation does not mean causation, RegTech and Blockchain have a parallel trend in popularity with a 95% correlation in monthly Google Searches.

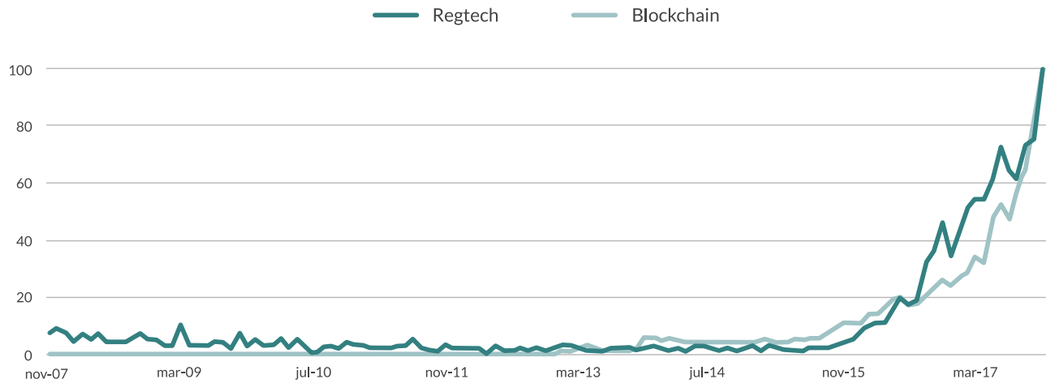


Figure 25. Number of searches of RegTech and Blockchain. Source: Google Trends (2017)

Brief Explanation of the Blockchain

The Blockchain is an irreversible distributed ledger. It uses hash functions that map arbitrary data size input into a fixed data sized output. A key characteristic of the hash functions is that any small change in the input changes the whole output. In the Blockchain, each block inputs the previous block, current transactions and a timestamp in the hash function.

The blocks are stored in a distributed network composed of many users, called nodes. Thus, the information stored in the Blockchain cannot be tampered without notifying every node.
The Bitcoin blockchain provides a high degree of security. As of November 2017, over USD2 billion are transacted each day in the Bitcoin Network without a single hacking incident ever taking place.

This security can also be applied to smart contracts. A smart contract consists on a set of transitional states. The transition from one state to the next requires the distributed network to approve it. Thus, developers can create computer programs with specific functions according to each state. For instance, imagine that Mr. B. wants to buy stock A for EUR50. The smart contract would first collect all required information from the user. Once the information has been verified, the nodes will approve the transition to the second state. The second state requires Mr. B. to make a transfer of EUR50. Once the smart contract has received EUR50, the nodes approve the transition to the third state, which provides Mr. B. with the stock. Once Mr. B. has collected the stock, the smart contract will report all the necessary information to the competent authorities. This process is an example of the type of smart contracts that are fully automated at a minimum cost.

Blockchain can be either public or private. The public Blockchain (e.g. Bitcoin) is governed by a set of incentives given to the miners (nodes) while the private Blockchain relies on trusted parties.

Most of the examples that apply to the RegTech Industry are based on Trusted Networks (Private Blockchains) due to confidentiality and scalability issues.

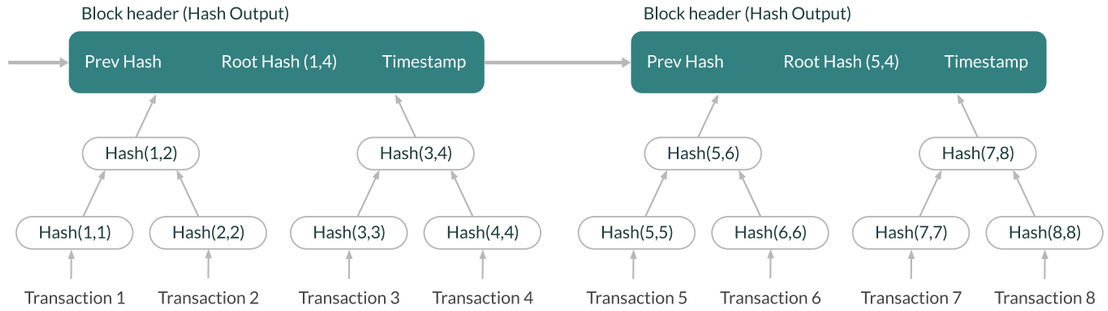


Figure 26. Block Explanation.

Corporate Governance

In 2015, David Yermack (2015) published a paper identifying the potential impact of Blockchain technology on corporate governance from a corporate management perspective. In the paper, he argues that Blockchain has potential benefits. Two years later, Nasdaq has managed to prove many of these advantages. Johan Toll, the product manager of Blockchain at Nasdaq and the inventor of a Blockchain US based patent, has commented on the Blockchain applications in Corporate Governance that Nasdaq has developed.

In 2015, Nasdaq launched Nasdaq Linq in the USA for facilitating the issuance, cataloguing and recording of transfers of private (non-listed) securities in the Blockchain. The project enabled clients to obtain a transparent record of issuance and transfer of securities increasing the auditability of the process. Johan Toll stated that the project was launched in the USA partially due to the regulatory and business landscape. In the USA, the private market is unregulated and highly fragmented. Consequently, consumers face high costs and have to deal with many intermediaries. Those characteristics made it an ideal market to be disrupted.

The project was a success and in 2016 it was incorporated to their newly designed Nasdaq Financial Framework, which is a reconciliation of its portfolio of systems. The framework creates a bridge between current applications and new technologies such as Blockchain and Machine Learning. It also provides a separation between applications and data stored delivering an open and agile environment (Nasdaq, 2016). Through their framework they are able to use existing applications in the Blockchain world.

In early 2016, Nasdaq launched an e-voting project based on Blockchain Technology in the OMX Tallin. The project was considered a success and is currently a functioning Proof of Concept (PoC). The platform provides the following advantages to investors.
One of the main goals was to ease shareholder participation and enable voting from distance, which

FIELD	BENEFITS
Record Stock Ownership	• The public recording of stocks increases transparency and reduces corrupt behaviour
Liquidity	• Faster transfer of shares • Reduce trading costs (fewer middlemen)
Managerial oversight	• Insider buying and selling will be detected by the market in real time • Prevent backdating compensation
Voting	• Increases accuracy • Detect empty voting
Real-Time accounting	• No longer depend on quarterly financial statements • Reduce the cost of auditors • Prevent accounting gimmicks

Table 7. Benefits of Blockchain. Adapted from excerpt in Yermack (2015)

CHARACTERISTICS OF E-VOTING PLATFORM

1. View information about meetings and vote before or during the meeting;
2. Use the system to transfer their voting rights to a proxy;
3. Monitor how the proxy voted on their behalf; and, if needed, recall the proxy; and
4. Review previous meetings and transactions based on the indelible record the system creates

Figure 27. Source: NASDAQ (2017)

is an increasing need due to growing cross-border investments. Months later Nasdaq partnered with Citi to provide a Blockchain-based global payment solution. Through the global payment solution, a user can inject USD1000 in a Citibank account and receive USD1000 tokens in the Blockchain. The tokens allow the user to pay for a security and receive the ownership instantly, which is a big gain in efficiency when compared to previous systems.

Nasdaq has extended its technology contract with SIX Swiss exchange for OTC derivatives and partnered with SEB to test a Blockchain-based mutual fund trading platform in Sweden. The Swedish mutual fund market is characterized by its high fragmentation and lack of central securities depository making it an ideal market to be disrupted. The platform will record all transactions and changes in mutual fund trades using a Blockchain-based platform (Anna Irrera, 2017b). Both projects are still in the process of being completed.

Blockchain has thus already passed from being a potentially disrupting industry to implementation in functioning markets. Nasdaq is not unique and many other companies are actively using Blockchain to increase transparency and speed up the transaction process. For instance, Chromaway, a Swedish Blockchain firm, has partnered with Lantmäteriet, Kairos Future, Telia Company, SBAB and Bank Landshypotek Bank to facilitate the land registry process. The land registry process requires many time-consuming activities from both the regulator and the person acquiring real estate. Blockchain technology can ease the process by automating each step along the registration. Table 8 is an excerpt from a Chromaway land registry report illustrating the advantages of their Blockchain based solution.

BENEFITS OF THE LAND REGISTRY BLOCKCHAIN BASED SOLUTION	
1	Eliminating the need for physical archives of contracts and files.
2	Increased resilience and redundancy of the transactional data in the land registry and the mortgage deed registry.
3	Greater security for users of the system, in part because validation of the purchasing contracts and ownership can be done independently from Lantmäteriet.
4	Faster and more transparent transactions.
5	Official registration and confirmation of pending ownership around four months earlier than in the current process, which allows more information and data of transactions to be available, increase liquidity of real estate since it can be sold by the soon to be owner, and more.
6	Making it possible to receive automatic confirmation of final land title at the date of transaction.
7	Significantly improved mortgage deed handling, and making payments of loans dependent on secure transfer of mortgage deed.
8	Elimination of the possibility of selling a property more than once.
9	Making it more difficult to steal a property.

Table 8. Land Registry Blockchain-based solution. Source: Chromaway (2017)

3.9 CLOUD SERVICES

Another key development that is expected to take a prominent role in the financial industry and ease compliance costs are cloud services. Compared with legacy systems, the main benefits that the cloud offers are outlined below.

The cloud allows banks to obtain a full overview of its clients, update its infrastructure seamlessly and to reduce its infrastructure costs substantially. For all these reasons, financial markets are showing a strong interest in adopting cloud services as a core part of their organization.

In 2016, a SAP benchmark survey showed that more than 93% of financial services executives believed that cloud solutions will transform their organization (Rieker, 2016).

CLOUD ADVANTAGES	
Cost Savings	The research firm IDC Financial Insights calculated that the global biggest banks would save USD15 billion by cloud adoption with a 25% decrease in infrastructure costs. The same research also reported that two-thirds of the biggest global financial banks will use cloud services by next year.
Data Security	Technology firms that provide cloud services such as Amazon responded to data regulations and established its data centres around the globe to comply with local regulations. They have also focused on increasing security measures and received praise from important figures in the financial industry, such as John Madsen, the co-head of technology at Goldman Sachs, who said when asked about cloud networks security "We've had a lot of success with those efforts".
Scalability	Cloud networks provide flexibility allowing the FI to adapt to client demand.
Regulatory Transparency	Cloud services allow a FI to harmonize its system across the whole organization. This provides a competitive edge for updating the IT infrastructure at a minimum cost across the whole organization.
Customer Relationship	Mobile banking has radically changed the way customers interact with banks. A cloud service eases the interaction between the banking mobile application and the user. For instance, FIs are required to do periodical checks with their clients to update their information. The process can be done at a minimum cost in the cloud.

Table 9. Cloud advantages. Source: Anna Irrera (2017) and Niall Twomey (2017)

3.10 FUTURE OUTLOOK

Sweden has one of the best ecosystems for startup in the world. Its ecosystem is a mix of high quality universities, large venture capitalists, and a culture that encourages innovation. As a result, Sweden's capital, Stockholm, produces the largest number of Unicorns per capita after Silicon Valley (Forbes, 2015).

This ecosystem has played an important role in enabling RegTechs to develop and expand rapidly. Nonetheless, the UK has taken the leading role as the UK Government promoted the RegTech industry early on, through the 2015 Budget, with the regulatory sandbox. The regulatory sandbox allowed companies to test financial services innovations in a supervised space. This promotion encouraged UK companies to develop early on, obtaining a first-mover advantage. For that reason, we encourage Swedish regulators to take a similar approach and establish a regulatory sandbox. Linda Hedvall, the global head of compliance monitoring at SEB, agrees saying that, *Sandboxes will be good also in the way that it could reduce the barrier of entry for new players in the market to have to these kind of sandboxes where they can try out new technologies, and new ways of thinking and also get the opinion of the supervisor. It [the goal] is not to*

get a lot of services and products that are unregulated, but actually getting people onboard from the beginning (...). I think that creating things like Sandboxes can help them [the regulators] for the future looking work that they have ahead. The combination of the regulatory sandbox together with the already existing startup ecosystem would play a key role in enhancing the RegTech industry in Sweden.

However, it is also important for financial firms, RegTechs and regulators to cooperate in order to further develop the market. In many aspects of the RegTech industry, economies of scale play a decisive role in lowering compliance costs and cooperation is required. **Most of the Swedish companies identified in this report started with smaller amounts of capital compared to their counterparts in the UK and were noticed by banks only after they expanded.** On the contrary, many UK firms were founded recently and managed to partner with important financial institutions early on. This early cooperation was another key factor that has enabled the UK to gain a prominent role in the RegTech industry. Lan-Ling, the Head of Women in FinTech at the Stockholm FinTech Hub, argues that another key factor in UK RegTech development is that, *the revenue coming into London for banking is huge, but that is not the same as here in Sweden*.

Furthermore, Swedish financial firms have acknowledged the objectives of the new regulations and are actively investing to develop the architecture needed to facilitate smooth compliance. However, the short deadlines are forcing them to first develop tactical short-term solutions to meet the deadlines. For instance, when asked about SEB strategy to comply with new regulations, Linda Hedvall replied, *It is about actually coming to be able to build something that really adds value for our clients. That's what we aim for, and I think that a lot of regulations that are coming now are helping us in that direction. If you think about what the future clients would really like to want from a bank, then I think that the regulations now are forcing us to do a lot of things that are needed in order to provide that. That's why we think this strategy is so important. Then of course because of the deadlines we need to make some tactical solutions for now, but for us it is very important to have a clear long-term strategy.*

The commitment of FIs to a long-term strategy with regards to new regulations is the most important part in easing compliance costs and staying competitive in the future.

Moreover, when asked about the future outlook for FIs, Lan-Ling, the Head of Women in FinTech at Stockholm FinTech hub, argues that:

There will be many more companies that will take part in the value chain away from the banks, and that banks might find themselves to be more like a utility company. At the same time banking is regulated for a reason. Sometimes individuals forget that banks have been regulated for a long period to avoid bigger disasters than the 1929 and 2009 world financial crisis. Individuals have not really experienced the pain that could happen if banks were not regulated at all. Given that they are regulated, it is not obvious that FinTechs are not going to win that particular game.

Technology can help, and FinTechs are much nimbler, but they are not robust. One of the reasons why banks are not nimble is because they can't afford a problem, they can't afford the security issue, they can't afford mistakes. On the contrary, FinTechs can have some mistakes because they are young and nobody expects them to be perfect. However, once they become part of the system excuses will not be accepted. FinTechs will have the same scrutiny that a bank does and they will also slow down to the pace of a bank. It might be with better technology because the banks are handicapped by legacy systems, but I don't think the pace is going be as fast as some might project.

This contributes to the argument that FIs should focus on their core competitive advantages and on modernising their legacy systems. The traditional banking value chain is thus expected to be partially disrupted by new technologies. Nonetheless, this disruption will only occur in specific activities that do not require the higher levels of robustness and security.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3.11 CONCLUSION

The RegTech chapter illustrates how different regulations impact the financial industry and drive technological solutions available to ease the compliance process. FIs must understand that in a competitive market two main factors contribute to the success or failure of a product or service: production costs and perceived value from the customer. The difference between production costs and perceived value is profit. At the moment, compliance requirements are increasing production costs but the increase has not yet exceeded the perceived value. However, in the long run, companies that are able to reduce compliance costs will be able to focus on enhancing the customer experience and drive down the perceived value of traditional financial services. **Companies that do not adapt will eventually reach a point at which their perceived value does not exceed the production costs and will be overtaken by the competition.**

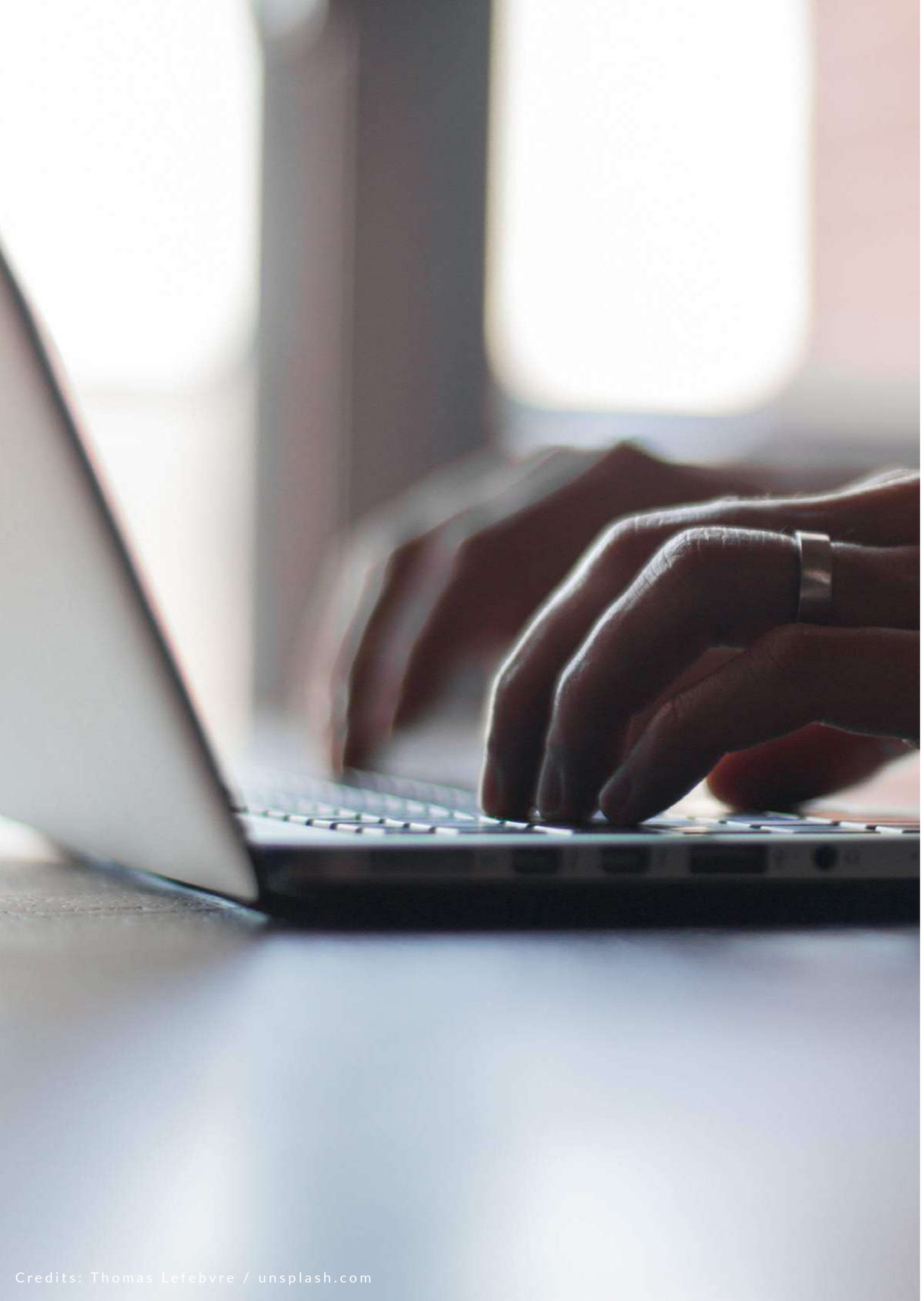
Many of the regulations outlined in the report are a result of an evaluation process by which regulators identified deficiencies in previous regulations. FIs must understand that this evaluation process followed by new regulations is a continuous process and should expect upcoming regulations in the future. Thus, an understanding of the key objectives laid out by regulators and a long-term strategy to solve compliance issues is necessary. This long-term strategy requires FIs to re-architecture their data infrastructure and obtain a holistic view of their clients. FIs must look for new technologies that will allow them to provide the best service at the lowest cost and cooperate with those firms or individuals that are best at providing compliance solutions in order to stay competitive.

FIs should not see compliance costs as an innovation killer but as an innovation enabler. As stated by Freij & Bieck (2010), regulations enhance innovation in three different ways.

Firstly, they force companies to implement solutions that are necessary. Secondly, they generate new business models. Thirdly, they promote companies that are able to surpass traditional thinking.

For instance, BCBS 239 requires banks to transform their legacy risk data architecture, which enables them to create a client focused business platform that uses Big Data to enhance their capabilities.

For all these reasons, FIs should see new regulations as an opportunity to upgrade their current system and maximize the value provided to the customer.



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CONCLUSIONS AND RECOMMENDATIONS

This report has sought to establish an understanding of the underlying drivers for the disruptive waves that are drawing ever-closer to the core of the Financial Services industry, and the ways in which industry collaboration could increase the value for end-customers as well as reduce operating costs.

Firstly, it appears that InsurTech startups are developing business models and technologies that can support incumbent insurers in better serving their end-customers and – albeit unlikely at the current stage – which could take over more aspects of the insurance value chain from them. However, due to the inherent complexity involved in issuing and operating insurance policies, notably high capital requirements and regulatory hurdles, a more likely scenario is that InsurTech startups, incumbents, and technology companies, will collaborate to deliver better and cheaper products to end-consumers, while simultaneously reducing operating costs.

Secondly, in line with the continuing and recurring introduction of increasingly complex and recurring, financial institutions are well incentivized to create a long-term strategy to ease the compliance process. This long-term strategy requires FIs to evaluate how can they provide the maximum value to their customers and focus on their core competitive advantages. RegTechs should understand which regulatory solutions they are better positioned to deliver on and partner accordingly with FIs to provide tailored solutions. The expected result is a disruption of the traditional value chain wherein each company focuses on its core capabilities. In the case of commoditizing services, such as execution costs, economies of scales will play a prominent role as such services are not differentiated.
For other services, such as commercial banking, the relationship between FIs and the client will play a critical role. FI are encouraged to use new technologies to enhance this relationship and increase the perceived value for end-customers.

Sweden has a long tradition of Financial Services, and has positioned itself as a European frontrunner for FinTech. Therefore, it is likely that we will see a continuation of InsurTech and RegTech innovation emerging from Sweden and expanding globally. FIs, looking to enhance their operations and relevance in the Open Banking era, are thus motivated to collaborate with startups to facilitate this transformation.

Lastly, in order for the ecosystem to develop properly, and for Sweden to remain a top destination for Financial Services investment, the regulator, Finansinspektionen, should maintain and develop closer relationships with both incumbents and startups to not only ensure compliance, but to spur innovation and industry collaboration for the benefit of all parties in the ecosystem.

RECOMMENDATIONS FOR INSURTECH

- By establishing long-term IT investment strategies that can take 10 years to realize, incumbents can ensure that migrations to digital data platforms are seamless. Partnering with InsurTech startups can prove a cost-effective and efficient solution in such a strategy.

- Consumers, and in particular millennials, increasingly vote with their feet. In order to stay attractive within the market and maintain customer loyalty, it is vital that the customer offering and relationship are tailored to the individual.

- By utilizing new technological capabilities, such as IoT and artificial intelligence algorithms, insurers can transform themselves from being reactive to proactive insurers. Proactive insurers not only reduce cost and can offer better products and services, but also increase their chances of enhances their relationship with customers.

RECOMMENDATIONS FOR REGTECH

- Financial institutions must understand the intentions of the regulations and not consider regulation merely as a check list. The regulatory environment is becoming more dynamic and FIs must design a data architecture that is able to adapt to this new regulatory environment seamlessly.

- Financial institutions must not only seek to find regulatory solutions on a case-by-case basis but also find a common approach to the regulatory change process. A platform that covers different aspects of the relationship between the client and the firm, as suggested in actor management, is encouraged.

- Blockchain allows financial institutions to automate the reporting and transaction process in a secure way. Its high degree of security is expected to take a central role in many aspects of the financial industry.

RECOMMENDATIONS FOR THE REGULATOR

- Regulators must also take a proactive stance and cooperate with Financial Institutions and RegTechs. The UK's FCA proactive stance on regulatory technology is an example of how regulatory authorities can promote industries.

- A Swedish sandbox is encouraged as it would attract RegTech firms across Europe. This could create a turning point in which Sweden obtains a prominent role in the RegTech industry as the UK leaves the European regulatory framework.

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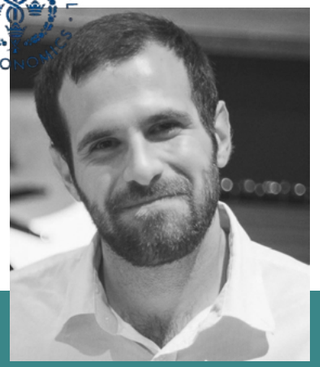

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